BY ORDER OF THE
SECRETARY OF THE AIR FORCE

AIR FORCE INSTRUCTION 91-212

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Safety

BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD (BASH) MANAGEMENT PROGRAM

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This instruction provides policy and guidance for implementing an effective Bird/wildlife Aircraft Strike Hazard (BASH) management program for the U.S. Air Force (USAF). It establishes program requirements, assigns responsibilities for program elements, and contains program management information. This instruction provides guidance on programs as specified in AFI 91-202, *The US Air Force Mishap Prevention Program*, AFI 91-204, *Safety Investigations and Reports*, and Air Force Manual (AFMAN) 91-223, *Aviation Safety Investigations and Reports*. This instruction implements the requirements of Air Force Policy Directive (AFPD) 91-2, *Safety Programs*. This instruction applies to all USAF personnel, including Air Force Reserve Command (AFRC) and Air National Guard (ANG) units. Host nation instructions receive precedence over this publication in overseas locations. Adhere to this instruction in the absence of host nation guidance if it is consistent with host country laws and Status of Forces Agreements. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the AF Form 847, *Recommendation for Change of Publication*; route AF Form 847s from the field through the appropriate Major Command (MAJCOM) Safety office. Send MAJCOM/Field Operating Agency (FOA)/Direct Reporting Unit (DRU) supplements to AFSEC/SEF, 9700 G Avenue SE, Kirtland AFB NM 87117-5670, for approval before publication or via the AFSEC/SEF organizational email, **SEFW@us.af.mil**. The authorities to waive requirements in this publication are identified with a Tier ("**T-0**, **T-1**, **T-2**, and **T-3**") number following the compliance statement. See AFI 33-360, *Publications and Forms Management*, Table 1.1 for a description of the authorities associated with the Tier numbers. Submit requests for waivers through the chain of command to the appropriate Tier waiver approval. Ensure all records created as a result of processes prescribed

in this publication are maintained in accordance with Air Force Manual (AFMAN) 33-363, *Management of Records*, and disposed of in accordance with the Air Force Records Information Management System (AFRIMS).

SUMMARY OF CHANGES

This document is a complete rewrite of Air Force Pamphlet (AFPAM) 91-212, *Bird/wildlife Aircraft Strike Hazard (BASH) Management Techniques*, and must be completely reviewed.

The following changes are highlighted: 1.4.9.11. Every 72 months, conduct a stand-alone formal wildlife hazard assessment. A wildlife hazard assessment is a one year study to identify wildlife hazards and their attractants on, and surrounding the airfield. The primary focus of this assessment is to address wildlife issues and habitat, outside of the normal bird concerns, that may be impacting airfield operations. Further assistance and guidance can be attained from the local United States Department of Agriculture-Wildlife Services (USDA-WS) office, and overseas locations can contact Air Force Safety Center. Installations with a full time USDA wildlife biologist are not required to perform the 72-month assessment. It is understood that their daily, weekly and monthly surveys and duties will meet the intent of this wildlife hazard assessment survey. 2.4.6. Additional tools for conducting wildlife surveys. The use of Small Unmanned Aerial Systems or Radio Control Vehicles with cameras may be authorized for use and have the potential to provide valuable wildlife diversity, abundance, habitat, behavior, and location information without dispersing or flushing the wildlife into the Wildlife Exclusion Zone. The information provided by these tools, allow Bird/wildlife aircraft strike hazard managers to evaluate their programs' effectiveness and identify where to focus limited resources. 2.5.2. Identify all impact points on the mishap object. Collect all feathers/feather fragments, Deoxyribonucleic Acid (DNA) samples, or other representative wildlife remains for possible submission to the Smithsonian Institution Feather Identification Lab in accordance with instructions provided in AFMAN 91-223. Photographs of whole carcasses may be used to identify species after AFSEC/SEFW and Smithsonian Scientist concur on species identification. Otherwise carcasses or feather remains will be submitted.

Chapter 1

GENERAL ROLES AND RESPONSIBILITIES

1.1. Overview. This instruction applies to the Bird/wildlife aircraft strike hazard program operations of manned and unmanned Aircraft, Remotely Piloted Aircraft (RPA), and Small Unmanned Aircraft Systems (SUAS). Aircraft collisions with wildlife cause millions of dollars in damage annually resulting in the loss of combat capability, aircrews, and aircraft. Damage to airfield infrastructure by burrowing animals degrades airfield surfaces presenting additional hazards. Wildlife strike hazards to aircrew and aircraft (as well as operations and maintenance expenditures) may be significantly reduced by utilizing an integrated pest management approach, resulting in substantial savings of USAF resources. Additionally this program will follow the Sikes Act, *Conservation Programs On Military Installations, Section 101*; USDA guidance and DoD Instruction 4715.03, AFI 32-7064, *Integrated Natural Resources Management* for wildlife conservation consistent with the intended use of the military installation subject to aviation safety requirements.

1.2. Bird/wildlife Aircraft Strike Hazard Team. The Team is responsible for coordinating efforts throughout the USAF and assists USAF organizations worldwide to reduce the risk of wildlife strikes. The Team is located at Air Force Safety Center (AFSEC/SEFW; 9700 G Avenue SE, Suite 266; Kirtland AFB, NM 87117-5670). Additional information regarding Bird/wildlife aircraft strike hazard topics may be accessed through the Air Force Portal under Air Force Portal/Safety/BASH.

1.3. Roles and Responsibilities.

1.3.1. SE will:

1.3.1.1. Create policy and provide guidance for the USAF Bird/wildlife Aircraft Strike Hazard Management Program.

1.3.2. AFSEC/SEFW will:

1.3.2.1. Propose program management policies and guidelines to AF/SE.

1.3.2.2. Analyze wildlife strike data to provide baseline information to USAF agencies.

1.3.2.3. Approve the exchange and distribution of Bird/wildlife strike information to U.S. Government and foreign agencies.

1.3.2.4. Assist MAJCOMs with program management, development and implementation as necessary.

1.3.2.5. Provide instruction or instruction material to Flight Safety Officers, Noncommissioned Officers and civilian equivalents in program management and provide basic Bird/wildlife aircraft strike hazard training at Air Education and Training Command (AETC) sponsored training programs.

1.3.2.6. Maintain a technical reference library on hazard studies and other records.

1.3.2.7. Provide Subject Matter Experts to communicate Bird/wildlife hazard issues at MAJCOM request.

1.3.2.8. Provide technical assistance to the Safety Investigation Board President anytime birds/wildlife may be a contributing or causal factor in a mishap, or upon request.

1.3.2.9. Identify specific training requirements for AETC.

1.3.2.10. Review proposed conservation projects, as well as federal and state legislation affecting the USAF Bird/wildlife Aircraft Strike Hazard reduction program, and coordinate the AF/SE response with the USAF and other agencies.

1.3.2.11. At installation's request (when coordinated through respective MAJCOM and external agencies), provide:

1.3.2.11.1. Technical assistance to reduce Bird/wildlife hazards at installations with flying operations.

1.3.2.11.2. Technical assistance in evaluating installation Bird/wildlife aircraft strike hazard Management Plans.

1.3.2.11.3. Recommendations for changes in operational procedures to installation flight safety to reduce Bird/wildlife strike risk.

1.3.2.12. Identify research requirements for Bird/wildlife data and Bird/wildlife control techniques as well as develop, fund, and manage relevant research projects.

1.3.2.13. Identify, develop, test, and approve programs to aid in evaluating potential bird strike hazards in low-level airspace.

1.3.2.14. Establish and maintain liaison with international, federal, state, and private agencies.

1.3.2.15. Oversee management of USAF wildlife hazard advisory systems and the bird feather/wildlife strike remains identification program.

1.3.3. A3 will:

1.3.3.1. Establish and monitor operational procedures to reduce the frequency and severity of Bird/wildlife strikes.

1.3.3.2. Assist other USAF agencies in developing and implementing Bird/wildlife avoidance techniques (as requested).

1.3.4. A4C will:

1.3.4.1. Propose additional wildlife hazard reduction policies and guidelines to AF/SE or AFSEC/SEFW.

1.3.4.2. Develop policy management strategy to ensure military readiness and combat capability while reducing Bird/wildlife hazards to flight operations.

1.3.4.3. Oversee installation training in Bird/wildlife identification to ensure federally listed species are protected from inadvertent harassment or removal unless permitted.

1.3.5. MAJCOM Safety Offices (SE) will:

1.3.5.1. Ensure each installation conducting or supporting flight operations annually reviews their published Bird/wildlife aircraft strike hazard plan. Include all tenant units, auxiliary airfields, forward operating locations, transit centers, landing zones, drop zones

(without a landing strip), low-level routes, ranges, low-altitude tactical navigation areas (LATN), etc. in the plan. Additionally, ensure that airfield training (e.g. practice approaches, low-level flying, etc.) conducted at other than home station have Bird/wildlife hazard and management procedures addressed in the Memorandum of Agreement (MOA) or Memorandum of Understanding (MOU) for airfield operation/use.

1.3.5.2. Verify installations within their Command annually evaluate installation and low-altitude airspace (such as flights routes, operating areas, and LATN) for Bird/wildlife hazard concerns and make appropriate changes in mitigating risk to include assessing potential Bird/wildlife strike hazards, or when establishing or revising operational procedures.

1.3.5.3. Conduct on-site reviews of Bird/wildlife hazard management programs (to include potential hazards and mitigation techniques) for installations with assigned aircraft or supporting flight operations at geographically separated locations every 36 months. Coordinate as needed with AFSEC/SEFW. Tenant unit programs will be reviewed by owning MAJCOMs. Reviews may be scheduled during recurring inspections or staff assistance visits. Forward a copy of on-site reviews to AFSEC/SEFW upon completion.

1.3.5.4. Ensure coordination of Bird/wildlife Aircraft Strike Hazard Plan and program activities with Host Nation authorities for installations outside the United States.

1.3.6. Air Education and Training Command (AETC)/SE, in addition to paragraph 1.3.5, will:

1.3.6.1. Incorporate wildlife strike hazard reduction training in AETC-sponsored installation pest management specialist, safety technician, and airfield manager formal training courses.

1.3.6.2. Incorporate safety awareness of wildlife hazards in formal undergraduate and follow-on aviation training program safety briefings.

1.3.6.3. Forward all Bird/wildlife aircraft strike hazard-related training to AFSEC/SEFW for content review.

1.3.7. Air Force Materiel Command (AFMC)/SE, in addition to paragraph 1.3.5, will:

1.3.7.1. Implement wildlife impact resistance into the design of manned and unmanned aircraft, subsystems as validated by a requirement from the Using Command.

1.3.7.2. Consult with AFSEC/SEFW when conducting research projects to develop and demonstrate components or subsystems that improve wildlife strike resistance.

1.3.7.3. Provide technical consultation when requested by AETC for building/updating training necessary to maintain wildlife impact resistant subsystems.

1.3.7.4. Exchange appropriate wildlife strike resistance information with representatives of domestic and international industrial, academic, Department of Defense and other government agencies.

1.3.8. National Guard Bureau (NGB) will:

1.3.8.1. Ensure each ANG installation/unit conducting or supporting flight operations has a written Bird/wildlife Aircraft Strike Hazard Plan. Ensure all tenant units are included in the ANG installation plan. **Note:** Units that operate remotely piloted aircraft and small unmanned aerial systems beyond line of sight, and have no other local physical flying assets assigned, are not required to maintain a Bird/wildlife aircraft strike hazard plan for a geographically-separated short-term operating location.

1.3.8.2. Review ANG installation Bird/wildlife Aircraft Strike Hazard Plans annually and conduct on-site reviews of installation programs at least every 72 months (to include potential hazards and mitigation techniques). Coordinate as needed with AFSEC/SEFW. Non-ANG tenant unit programs will be reviewed by owning MAJCOMs at least every 36 months and may be scheduled during recurring inspections or staff assistance visits. Forward a copy of on-site reviews to AFSEC/SEFW upon completion.

1.3.8.3. Periodically evaluate installation and low-altitude airspace (such as flights routes, operating areas, and LATN) for Bird/wildlife hazard concerns and make appropriate changes to mitigate risk. These concerns will, at a minimum, be evaluated as often as route reviews and/or other airspace evaluations as outlined in AFI 13-201, *Airspace Management*.

1.3.8.4. Provide Bird/wildlife hazard analysis on installation and low altitude airspace (Military Training Area (MTA) routes, ranges, Military Operating Areas (MOAs), LATN, etc.) to all using organizations.

1.3.8.5. Assess potential Bird/wildlife strike hazards annually, or when establishing or revising operational procedures, military training routes, test or training ranges, instrument approach and departure procedures, MOA, or LATN.

1.3.9. Host Wing or Installation Safety Offices will:

1.3.9.1. Establish a local program and designate a Bird/wildlife Aircraft Strike Hazard Program Manager for all USAF, AF Reserve, joint service and ANG installations/units hosting or supporting flight operations unless delegated to another organization through a formal agreement (e.g., Contract, Host-Tenant Support Agreement, Memorandum of Agreement, etc.). **(T-1)** Wing Safety (in coordination with Civil Engineers/Natural Resources) is the Office of Primary Responsibility for development and oversight of this program. **(T-1)** Tenant Air Force units operating from non-Air Force hosted locations will establish a Bird/wildlife Aircraft Strike Hazard plan. **(T-1**) For Joint Bases where Flight Safety is not part of the installation safety office, the Air Force unit with the preponderance of aviation resources will have the overall responsibility for the administration of the installation plan. Maintain communications with surrounding airfields within local vicinity to ensure wildlife hazard plans do not conflict (harassment effects for Bird/wildlife movement between airfields). At installations with multiple wing safety offices, establish a Memorandum of Agreement between all wings designating which wing (in coordination with Civil Engineers/Natural Resources) will be the OPR for development and oversight of the program. **(T-2)**

1.3.9.2. Establish and review plan annually for compliance with current directives and changing conditions/environment. **(T-1)**

1.3.9.3. Coordinate Bird/wildlife Aircraft Strike Hazard Plan and program activities with Host Nation authorities for installations outside the United Sates. **(T-1)**

1.3.9.4. Ensure the Plan is incorporated into the Installation Integrated Natural Resources Management Plan. **(T-1)**

1.3.9.5. Ensure Operations Group Commanders define restrictive flight guidance for aircrews during specific airfield Bird/wildlife Watch Conditions to limit exposure to wildlife hazards. **(T-1)**

1.3.9.6. Ensure operational flying deployments, exercises, or training schedules account for wildlife hazard considerations, and ensure leadership and aircrews thoroughly evaluate mission requirements utilizing all available Risk Assessment (RA) methods and tools before conducting flight operations. **(T-3)**

1.3.9.7. Report all wildlife strikes in accordance with AFMAN 91-223, *Aviation Safety Investigations and Reports*. **(T-1)**

1.3.9.8. Forward wildlife remains in accordance with the Bird/wildlife Aircraft Strike Hazard reporting requirements paragraph 2.5.2, Bird/wildlife Aircraft Strike Hazard website, and AFMAN 91-223. **(T-1)**

1.3.9.9. Procure and maintain at least two Bird/wildlife Aircraft Strike Hazard 870 shotguns (for all installations with a Bird/wildlife Aircraft Strike Hazard program) for the organizations responsible for wildlife depredation. **(T-3)**

1.3.9.10. Designate agency(ies) in the Bird/wildlife Aircraft Strike Hazard Plan (approved by Installation Wing/Commander) to inspect the airfield perimeter security fence at least monthly and after a significant weather event to detect, report, and repair breaches that allow wildlife to enter the airfield environment. **(T-3)**

1.3.9.11. Conduct a stand-alone, year-long, to include all seasons, formal wildlife hazard assessment every 72 months that specifically inspects the immediate Wildlife Exclusion Zone, airfield infrastructure components and perimeter fencing within a 5-mile perimeter from any point of the runway center line. The primary focus of this assessment is to address wildlife issues and habitat, outside of the normal bird concerns, that may be impacting airfield operations **(T-1)**. Further assistance and guidance can be attained from the local USDA-WS office and AFSEC/SEFW. Installations with full time USDA wildlife biologist are not required to perform the 72-month assessment. It is understood that their daily, weekly and monthly surveys and duties will meet the intent of this wildlife hazard assessment survey. **(T-3)**

1.3.10. Installation Bird/wildlife Aircraft Strike Hazard Program Manager will ensure:

1.3.10.1. Establish and conduct Bird/wildlife Hazard Working Groups consistent with paragraph 2.2. **(T-1)**

1.3.10.2. Designate a Wildlife Exclusion Zone or other appropriate mitigation zones (airfield specific) encompassing the Aircraft Movement Area, clear zones and any additional habitat attractants (such as water treatment facilities, golf courses, landfills, and athletic fields) in proximity to the airfield and low-level flight corridors (such as final approach/departure). **(T-1)**

1.3.10.3. Develop or ensure development of Bird/wildlife Hazard Warning Procedures to inform aircrews of possible flight hazards due to wildlife activity on the airfield and in local areas. **(T-1)** Bird Watch Condition codes will be used to communicate local wildlife activity along with location, number and type of wildlife. **(T-1)**

1.3.10.4. Designate, or ensure designation of Phase I and Phase II periods of wildlife activity based on historical wildlife activity, current trend information and local conditions. **(T-1)** Establish flight and scheduling procedures to minimize risks based on local hazards associated with Phase I and II (See Para 2.2.2.3.8 or 4.1.2) **(T-1)** Publish Phase I and II designations in the appropriate Department of Defense (DoD) Flight Information Publications (FLIP). Critical updates may be made using Notice to Airmen (NOTAM) system.

1.4. Technical Assistance. Current information and technical assistance is available through multiple sources, including (but not limited to):

1.4.1. The USAF Bird/wildlife Aircraft Strike Hazard Team. Contact the USAF Bird/wildlife Aircraft Strike Hazard Team at AFSEC/SEFW, 9700 G Avenue, Suite 266, Kirtland AFB, NM 87117-5670. DSN: 246-5674/5848/5673 or Commercial: (505) 846-5674/5848/5673, and electronically by accessing the AF Portal Bird/wildlife Aircraft Strike Hazard Page (AF Portal/Safety/Bird/wildlife Aircraft Strike Hazard). The Team is available to assist in wildlife hazard reduction throughout the USAF. Personnel are trained in wildlife control and are experienced in wildlife ecology, land management, and flight operations. They also maintain current information regarding authorized control equipment and techniques.

1.4.2. Air Force Civil Engineer Center (AFCEC). AFSEC/SEFW works closely with center personnel to control wildlife, insects, habitat management, drainage, pavements and structures. Contact information is DSN: 312-523-6995, email: **AFCEC.RBC@us.af.mil**.

1.4.3. Federal and State Agencies. DoD airfields often employ professional wildlife biologists, foresters, entomologists, or agronomists who have valuable insights into installation-specific issues. Normally these professionals are embedded within base civil engineering. Local expertise and assistance is available (via interagency agreement) through the U.S. Fish and Wildlife Service, United States Department of Agriculture (USDA) Wildlife Services, state natural resources and/or wildlife departments, and game wardens. Be aware that many of these agencies are primarily concerned with wildlife conservation and may give wildlife conservation precedence over flight/wildlife safety (see paragraph **3.1**). Private contractors must not be hired to perform natural resources management services on DoD airfields unless Federal or State agencies are unable or unwilling to provide these services according to the "Sikes Act," Title 16 United States Code (U.S.C), Section (§) 670a(a-f), (DoD Instruction 4715.03 *Natural Resources Conservation Program* dated March 18, 2011 (Enclosure 3; Procedures), and AFI 32-7064 *Integrated Natural Resources Management*. **(T-0)**

1.4.4. Private consultants. If federal and state wildlife specialists are unable or unwilling to provide wildlife control services or the installation is located outside the continuous United States, private consultants are available (via contract) to assist in resolving wildlife hazards. Ensure all of the installation's requirements for wildlife control are clearly written in the contract. Confirm the contractor has a credible wildlife hazard management background, and

is willing to (and possesses the capability to) employ all legal integrated pest management techniques available prior to hiring.

1.4.5. Literature. Refer to the Bird/wildlife Aircraft Strike Hazard website to reference the most current listing of information on wildlife control methods and hazard reduction.

Chapter 2

PROGRAM MANAGEMENT

2.1. Program Overview. The primary role of every military aviation facility is to ensure mission readiness and combat capability while providing the safest flying environment possible. Military airfields are artificially maintained environments designed specifically for the safe launch and recovery of aircraft. Proper habitat management on and surrounding military airfields will reduce the probability of wildlife strikes and provide an adequate safety margin (wildlife exclusion zone). While it is impossible to keep all wildlife away from the airfield environment, it is important to discourage habitats that directly (availability of food, water, cover, and nesting) or indirectly (increasing prey species) attract wildlife; attracting wildlife to an airfield is mutually detrimental to wildlife and mission capability.

2.1.1. Local conditions that enhance the potential for wildlife/aircraft strikes vary at each installation. Birds may flock to airfields or cause hazards enroute. Hazards may be seasonal or year round. Wildlife activity varies as local conditions change from crop selection, land use choices (e.g. landfill operations), or established wildlife refuges. Installation-level personnel must remain vigilant of such attractants and be aware of local agricultural practices. The installation Bird/wildlife Aircraft Strike Hazard plan and Integrated Natural Resources Management Plan must be mutually supportive. The Integrated Natural Resources Management Plan, developed in accordance with AFI 32-7064, *Integrated Natural Resources Management;* must address wildlife management techniques that will reduce the potential for Bird/wildlife hazards to aircraft operations. Installations experiencing issues should first contact their respective MAJCOM/SE for assistance. Installations may also contact the jurisdictional agency for proper coordination to ensure compliance with state or federal regulations. Where appropriate, AFSEC/SEFW or AFCEC/CZTQ, Environmental Quality Technical Support, will provide additional assistance to resolve or reduce potential hazards. The contacts mentioned above may suggest proven methods for wildlife dispersal, avoidance procedures, or recommend land management techniques, that discourage wildlife activity from the airfield. However, the Installation Commander retains final authority and responsibility.

2.1.2. The key to a successful wildlife hazard reduction program is participation by well-trained individuals who are assigned specific tasks. While wildlife strikes will never be eliminated, an aggressive, well-planned program focused on wildlife behavior, environment, and mission may limit the potential for strike occurrence and/or severity. The following are guidelines for developing an effective program.

2.1.2.1. Due to the highly specialized nature of wildlife hazard management, it is strongly recommended that a dedicated wildlife hazard management professional be retained to assist with oversight, coordination, and execution of the Bird/wildlife Aircraft Strike Hazard Plan. Non-USAF wildlife hazard management personnel shall meet Qualified Airport Wildlife Biologist criteria as outlined in Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5200-36A, *Qualification for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife hazards on Airports*. This requirement applies in Contiguous United States (CONUS), Alaska, and Hawaii. Overseas, or other

than Contiguous United States, installations may utilize similarly qualified local wildlife professionals at their discretion.

2.1.2.2. Program personnel will be granted access and authority to conduct wildlife hazard management operations within all lands owned by the installation, that directly affect mission capability and flight safety. **(T-1)**

2.1.2.3. Bird/wildlife Aircraft Strike Hazard personnel shall have an understanding of the Sikes Act, 16 U.S.C. § 670a(3)(C), that states the purpose of wildlife conservation on military installations must be consistent with the use of the military installation and is subject to safety requirements. While commanders may choose to assist in the conservation of wildlife on an installation, Bird/wildlife Aircraft Strike Hazard personnel (with the oversight of the installation Safety Office) shall ensure the airfield, Aircraft Movement Area (approach/departure corridors, drop zones, etc.) and operational airspace outside the aircraft movement area are not utilized as wildlife conservation easements. **(T-1)**

2.1.2.4. Bird/wildlife Aircraft Strike Hazard personnel or program managers will establish independent relationships and communicate with all federal, state, and local wildlife related agencies, and off base private landowners as necessary. **(T-2)** Coordinate external communications with other concerned installation agencies.

2.2. Developing a Bird/wildlife Aircraft Strike Hazard Program. Each installation supporting a flying mission shall develop and publish a Bird/wildlife Aircraft Strike Hazard plan listing responsibilities and procedures. **(T-1)**

2.2.1. A properly written, flexible Bird/wildlife Aircraft Strike Hazard plan is necessary to reduce strike hazards and ensure continuity of knowledge with personnel turnover. Plans should be tailored to meet the specific hazards encountered locally. **(T-2)** Coordinate all habitat modification procedures ensuring natural resource plans are compatible with installation program plans. Refer to the Air Force Portal Bird/wildlife Aircraft Strike Hazard website for additional information to be included in the plan.

2.2.2. As a minimum this plan shall:

2.2.2.1. Identify local conditions (whether manmade or natural) on and surrounding the airfield that are attractive to birds/wildlife (long or short vegetation, insects, water drainage, signage, towers, etc.). **(T-2)**

2.2.2.2. Outline Bird/wildlife dispersal/depredation procedures, equipment, methodologies, permitting and designate an Office of Primary Responsibility. **(T-2)**

2.2.2.3. Bird Watch Condition and Phase I/II designations. Specify installation Bird Watch Conditions, Phases, location where codes/phases will be displayed, implementation procedures, authorization for declaring codes/phases, and flight operations under specified Bird Watch Conditions and Phases. **(T-2)** Bird Watch Conditions are based on visual observations of local airfield wildlife activity and are independent of the Bird Avoidance Model (BAM) or Avian Hazard Advisory System (AHAS) risk hazard levels. Phase I/II designations are based on historical seasonal wildlife and surrounding land use activity. Use the following definitions to delineate

Bird Watch Conditions and Phase designations for rapid communication of wildlife activity: **(T-2)**

2.2.2.3.1. Bird Watch Condition SEVERE. Wildlife activity on or immediately above the active runway or other specific location(s) representing a high potential for strikes. One animal in relationship to the Aircraft Movement Area may justify a severe condition (such as a vulture in the approach/departure corridor, or a large mammal or reptile on or near the runway). Supervisors and aircrews will thoroughly evaluate mission requirements utilizing all available risk assessment methods and tools before conducting flight operations in areas under Bird Watch Condition SEVERE. **(T-3)**

2.2.2.3.2. Bird Watch Condition MODERATE. Wildlife activity near the active runway or other specific location representing increased potential for strikes. Bird Watch Condition MODERATE requires increased vigilance by all agencies and supervisors and caution by aircrews utilizing appropriate risk assessment methods and tools.

2.2.2.3.3. Bird Watch Condition LOW. Bird/wildlife activity on and around the airfield representing low potential for strikes.

2.2.2.3.4. During daytime operations, Bird Watch Conditions will be determined by personnel viewing, patrolling, and analyzing actual Bird/wildlife activity on and around the airfield as delineated in the installation's Bird/wildlife Aircraft Strike Hazard Plan. **(T-2)**

2.2.2.3.5. During night or Instrument Meteorological Conditions (IMC) operations, Bird Watch Conditions may be determined by incorporation of Avian Hazard Advisory System or other remote sensing technology (e.g. Forward Looking Infrared (FLIR), Air Traffic Control (ATC) Radar, Avian Radar, etc.). In conjunction with (or in the absence of) other airfield observational methods, (including periods of low visibility or darkness), avian radars may be used to determine Bird Watch Conditions in accordance with local Bird/wildlife Aircraft Strike Hazard Plan guidance. If applicable, document avian radar operational procedures in the unit's Bird/wildlife Aircraft Strike Hazard Plan, Operational Instruction or local supplement prior to use. Supervisors of Flying (SOF) that utilize avian radar system monitors in air traffic control facilities shall ensure controllers assigned to an operational position are not distracted from performing their normally assigned duties. However, under normal circumstances, airfield management, safety, and Supervisors of Flying (if utilized) should only use the avian radar as an aid/secondary means to determine the Bird Watch Condition. **(T-3)**

2.2.2.3.6. Installation Bird/wildlife Aircraft Strike Hazard plans will specify aircrew notification procedures for Bird Watch Condition changes. **(T-2)** Use the most expeditious means of communicating the Bird Watch Condition (e.g. Air Traffic Control, Supervisor of Flying (SOF), command post, and Automated Terminal Information System (ATIS)).

2.2.2.3.7. Consider wildlife concentrations within the Wildlife Exclusion Zone when determining the overall airfield Bird Watch Condition. Bird Watch Condition

SEVERE or MODERATE requires action from the installation's wildlife dispersal team to reduce the Bird Watch Condition to LOW as soon as possible. **(T-3)**

2.2.2.3.8. Phase I/II designation criteria. Phase I represents normal, baseline wildlife activity. Phase II represents periods of significant increases in local wildlife activity normally associated with migratory movements, seasonal increases of local wildlife populations, or local land use practices (farming, ranching, or hunting).

2.2.2.4. Outline locally defined procedures for handling of non-damaging strike reports, damaging strike reports, remains for purposes of identification, wildlife sighting reports, and any other locally established Bird/wildlife forms and reports. **(T-2)**

2.2.2.5. Ensure specific Bird/wildlife Aircraft Strike Hazard requirements or limitations are addressed for all assigned aircraft, flying tenant units, and transient aircraft. **(T-2)**

2.2.2.6. Document wildlife records management requirements with Natural Resources or environmental personnel in the Bird/wildlife Aircraft Strike Hazard Plan. **(T-2)**

2.3. Bird Hazard Working Group. The formal Bird Hazard Working Group shall meet at least semi-annually. **(T-2)**

2.3.1. Establish documented tasks and responsibilities for all organizations within the Bird Hazard Working Group (see paragraph 2.2.2). **(T-3)**

2.3.2. At a minimum, the bird hazard working group will be comprised of representatives from the following organizations: Safety, Operations (flying squadrons, air traffic control, airfield management, and Operations Group Standardizations/Evaluations), Civil Engineers (natural resources, pest management, and as needed, operations, community planning, aircraft rescue and firefighting), Judge Advocate, Public Affairs, Security Forces, Services, Wildlife Biologist (if assigned), and flying tenant units. **(T-2)** The Vice Commander of the wing holding the preponderance of USAF flight assets and, if available, the installation host wing's Vice Commander will co-chair the formal Bird Hazard Working Group meetings. **(T-2)** Safety will act as the executive secretary for the group and at a minimum, maintain original meeting minutes. **(T-3)**

2.3.3. The working group will assist the Safety Office with drafting and implementing the Bird/wildlife Aircraft Strike Hazard Management Plan for any improvement projects on the installation. **(T-3)** Action officers from each tasked organization will meet prior to the formal Bird Hazard Working Group to discuss and resolve issues for presentation at this meeting. **(T-3)**

2.3.3.1. Bird Hazard Working Group meeting topics will include but are not limited to:

2.3.3.1.1. USAF and unit reported Bird/wildlife mishaps and incidents.

2.3.3.1.2. USAF Bird/wildlife Aircraft Strike Hazard Team information updates.

2.3.3.1.3. Locally observed/reported Bird/wildlife activity (to include low level ranges/routes).

2.3.3.1.4. Airfield inspections/surveys, recovered Bird/wildlife remains, Bird/wildlife strikes.

2.3.3.1.5. Local Bird/wildlife habitat management/modifications (to include dispersal/depredation activity), environmental/land management activity, land uses (landfills, agriculture crop seasons), current or projected community projects off installation with the potential to affect wildlife activity on or near the installation, and encroachment issues.

2.3.3.1.6. All proposed outdoor construction or modification projects.

2.3.3.1.7. Annual bird migrations.

2.3.3.1.8. Bird/wildlife Aircraft Strike Hazard-related budgeting issues.

2.3.3.1.9. Local Bird/wildlife Aircraft Strike Hazard plan procedures and responsibilities (to include observed effectiveness/deficiencies).

2.3.3.1.10. Bird/wildlife Aircraft Strike Hazard awareness training/education (to include Bird Watch Condition code definitions and communications).

2.3.3.1.11. Flying schedule and Bird/wildlife activity conflicts.

2.3.3.1.12. Status of Bird/wildlife Aircraft Strike Hazard equipment (Bird/wildlife Aircraft Strike Hazard 870 Shotgun, Avian Laser, Avian Radar, Acoustic Devices, Propane Cannon, Binoculars, etc.)

2.3.3.1.13. Status of bird dispersal supplies.

2.3.3.1.14. Review of Flight Information Publication documents for Bird/wildlife advisories (Phase I / II designations).

2.3.3.1.15. Review trend of traffic pattern bird strike rate. This is a function of traffic pattern bird strikes divided by the number of traffic pattern operations at your installation.

2.3.3.2. The working group shall ensure no improvement projects to the airfield, aircraft movement area, or clear zones are made with the purpose of attracting wildlife. **(T-2)** However, if conservation projects are approved, commanders shall dedicate adequate funds to remove/mitigate such projects should the wildlife hazard risk become unmanageable. **(T-2)** Civil Engineering will be responsible for coordinating construction projects with working group members. **(T-3)**

2.3.3.3. Appropriate Bird Hazard Working Group agencies shall define a Wildlife Exclusion Zone, or other relevant mitigation zones, specific to the airfield, installation, and flying mission. **(T-2)** A Wildlife Exclusion Zone is a locally defined, airfield specific, area of zero tolerance for wildlife, encompassing the aircraft movement area, clear zones and any additional habitat attractants (e.g. water treatment facilities, golf courses, and athletic fields) in proximity to the airfield and low-level flight corridors (approach/departure). Ensure the Wildlife Exclusion Zone is integrated into base mapping products such as imaginary surfaces criteria, land use maps, and operational constraint maps. **(T-2)**

2.3.3.3.1. Bird/wildlife hazard patrols shall be given priority access on the runway to disperse wildlife in the Wildlife Exclusion Zone, but especially during, SEVERE or MODERATE bird conditions. Coordinate active control methods with appropriate

agencies (such as the Tower Supervisor, Airfield Management, Command Post, Public Affairs, and Security Forces) prior to initiation, if the situation permits.

2.3.3.4. The installation Bird/wildlife Aircraft Strike Hazard program shall have a provision to annually evaluate installation and low-altitude airspace (such as flight routes, operating areas, and low-level routes) for bird hazard concerns and make appropriate changes to mitigate risk. **(T-2)** Additionally, the program should evaluate airfields other than home station that are used for training (e.g. practice approaches, low-level flying, etc.) for Bird/wildlife hazards. **(T-2)**

2.4. Documenting Bird/wildlife Hazards.

2.4.1. The presence and behavior of wildlife on an airfield is very dynamic and influenced by many variables that may change from year to year, season to season, and even hour to hour. Maintain historical records of local wildlife hazards including formal surveys is paramount to develop a successful Bird/wildlife Aircraft Strike Hazard Program. Conducting formal wildlife surveys and documenting dispersal/removal efforts helps personnel capture temporal (seasonal and diurnal) and spatial airfield use as well as behavior, abundance, and diversity of species. In addition to providing a report on the current use of the airfield by wildlife, survey data provides information that wing leadership may use to evaluate their program's effectiveness and where to focus limited resources. Perhaps most importantly, survey data provides continuity information during periods of personnel transition. Refer to Bird/wildlife Aircraft Hazard website for generalized wildlife behavior by species.

2.4.2. Air Force Base/Installation Bird/wildlife Aircraft Strike Hazard personnel shall conduct formal daily and nightly wildlife surveys throughout the year. **(T-2)** Forward collected data to the Bird/wildlife Aircraft Strike Hazard Program Manager and Natural Resources personnel for compilation and analysis (See Attachment 2).

2.4.3. Consider developing methods to map each wildlife dispersal or removal effort to assist in evaluating program effectiveness. This is best accomplished by assigning grid locations to the airfield or by applying Global Position System (GPS)/Geographic Information System (GIS) technology in the field. (See Attachment 2).

2.4.4. Consider photographing and summarizing all wildlife hazards on the installation. For example, pictures of gulls loafing on the airfield accompanied by observations showing the birds using a nearby sanitary landfill can provide a strong case against future expansion of the landfill. Good documentation brings awareness to the problem and supports mitigation efforts. Ensure photographers have proper authorization to photograph on the airfield and other sensitive areas.

2.4.5. Surveys should also document the relative size and abundance of insect and weed species present, as both contribute to the presence of wildlife on the airfield. A sweep net should be used to collect insect specimens for identification.

2.4.6. In addition to the supplies listed on the Bird/wildlife Strike Hazard website, the use of small unmanned aircraft systems or Radio Control Vehicles with cameras have the potential to provide valuable wildlife diversity, abundance, habitat, behavior, and location information without dispersing or flushing the wildlife into the exclusion zone. With this information, the Bird/wildlife Aircraft Strike Hazard Team can evaluate their program's effectiveness and where to focus limited resources.

2.5. Bird/wildlife Strike Reporting and Analysis.

2.5.1. Accurately and thoroughly report all Bird/wildlife Aircraft Strike Hazard events to help identify local wildlife trends for mishap prevention. Proper species identification of wildlife is an integral part of the program. A thorough analysis of the circumstances leading to wildlife strikes, in conjunction with wildlife survey/mitigation documentation, is vital before actionable recommendations for management and mitigation may be proposed. Report all wildlife strikes within the Air Force Safety Automated System (AFSAS) and submit wildlife remains to the Smithsonian Institution National Museum of Natural History (see para 2.5.2). As per AFI 91-204, *Safety Investigation and Hazard Reporting*, wildlife strikes with any cost up to $19, 999.00 will be classified as Class E. Wildlife strikes with no cost, will be classified in Air Force Safety Automated System as a hazard.

2.5.2. Identify all impact points on the mishap object. Collect all feathers/feather fragments, Deoxyribonucleic Acid (DNA) samples, or other representative wildlife remains for possible submission to the Smithsonian Institution Feather Identification Lab in accordance with instructions provided in AFMAN 91-223, *Aviation Safety Investigations and Reports*. Photographs of whole carcasses may be used to identify species after AFSEC/SEFW and Smithsonian Scientist concur on species identification (See AFSEC website). Otherwise carcasses or feather remains will be submitted. **(T-1)** Attach specimen photos to the Air Force Safety Automated System report in addition to submitting physical samples to the Smithsonian. Additionally, collect, submit, and file an Air Force Safety Automated System Bird/wildlife strike report for all wildlife remains, whether whole or in part, found on the airfield within 250 feet of a runway centerline, or within 1,000 feet of a runway end unless the animal's death may be definitively attributed to another source. **(T-1)**

2.5.2.1. Formally identifying wildlife strike remains as described in paragraph 2.5.2 supports federal and state depredation permits and may be used to defend against litigation. While utilizing locally employed professional wildlife damage control experts to assist with species identification process is recommended; it does not satisfy the above submission requirements. AF/SE has established a joint interagency agreement (with the Smithsonian Institution) to identify all wildlife remains involved with a suspected aircraft strike.

2.5.3. Exercise caution when handling wildlife remains, especially in/from regions of the world that may have disease transmission concerns (such as Avian Flu). Refer to special handling and shipping instructions in T.O. 1-1-691, *Cleaning and Corrosion Prevention and Control, Aerospace and Non-Aerospace Equipment.*

2.5.4. If wildlife shipment is delayed submit a status message in Air Force Safety Automated System in accordance with AFI 91-204, *Safety Investigations and Reports.* Contact the Smithsonian Feather Identification Lab if shipment status cannot be verified. Updated contact information may be found on the AF Portal Bird/wildlife Aircraft Strike Hazard website.

Chapter 3

AIRFIELD AND INSTALLATION HAZARD MANAGEMENT

3.1. Airfield Wildlife Management Overview. Airfields are artificially maintained environments designed specifically for the safe launch and recovery of aircraft. The Sikes Act (16 U.S.C. 670a) requires every installation that has natural resources to develop an Integrated Natural Resources Management Plan to provide for the conservation and management of those resources. Sikes Act Section 101(b) requires that the Integrated Natural Resources Management Plan preserve the installation's capability to support its military mission. The Sikes Act, 16 U.S.C. § 670a(3)(C), states the purpose of wildlife conservation on military installations shall be consistent with the use of the military installation and is subject to safety requirements. The installation Civil Engineering division shall work with the Safety Office to minimize flight risks and ensure that the Integrated Natural Resources Management Plan and the installation's Bird/wildlife Aircraft Strike Hazard plan are consistent. Minimize flight risks by making the airfield and Aircraft Movement Area unattractive to hazardous wildlife and employ depredation measures specified in those plans. Follow land use plans and the Integrated Natural Resources Management Plan to ensure the airfield and Aircraft Movement Area are not used or designated as wildlife conservation, wetland or grassland areas. **(T-1)** Maintain a zero tolerance of large free-roaming animals (deer, canines, geese, etc.) on or adjacent to the Aircraft Movement Area and areas that have unimpeded access to the Aircraft Movement Area. **(T-1)** Wings will program funds to ensure wetlands and grasslands are properly relocated away from the airfield and Aircraft Movement Area in accordance with federal regulations. To mitigate the possibility of being designated a delineated wetland, dedicate funds to ensure proper airfield drainage management of all areas within the confines of the Aircraft Movement Area. **(T-1)**

3.2. Mitigation Practices. Proper passive and active mitigation practices on and surrounding the airfield will successfully reduce threats from hazardous wildlife. These practices vary in cost and effectiveness depending on the situation. Passive mitigation measures are long-term in nature and involve managing the local airfield environment to eliminate or reduce conditions wildlife find attractive. Active control measures involve physical actions to disperse or remove wildlife from an airfield allowing short-term relief from an immediate safety hazard. As with any non-lethal control technique, wildlife may eventually habituate to the negative stimulus. Utilize all legal methods of wildlife damage control by incorporating an Integrated Pest Management strategy into the installation Bird/wildlife Aircraft Strike Hazard Plan.

3.2.1. Passive Mitigation Procedures. Habitat modification is the removal of attractive habitat features and is the most effective and best long-term strategy to decrease wildlife attraction to an airfield. Removing or decreasing the attractiveness of water bodies; eliminating nesting, perching, and roosting structures; and reducing food attractants/prey species on and surrounding the airfield are all crucial steps in decreasing the threat wildlife pose to flight safety. The following are best practices proven to successfully mitigate wildlife threats in many cases. For additional information on best mitigation practices, see Federal Aviation Administration's Advisory Circular 150/5200-33B, *Hazardous Wildlife Attractants on or Near Airports*.

3.2.1.1. Airfield Vegetation Management. Targeted vegetation management is critical to reduce wildlife hazards. Airfield vegetation, as well as adjacent locations, should provide

as little food resources (e.g., seeds, weeds, and insects) as reasonably possible for hazardous species of birds and large mammals and minimize cover for small mammals (e.g., raptor food attractant). Vegetative cover around active runways and taxiways is a functional part of almost every airfield. This cover reduces dust and armors the soil against jet wash that left unabated may reduce visibility and cause pavements to degrade along runway edges. It is paramount that installations have a working knowledge of local plant species and develop plans to remove or reduce risks associated with plants that are not compatible with aviation safety. Many non-endemic, invasive plant species are attractive to wildlife. Support Executive Order, EO 13112 *Invasive Species*, regarding invasive species management on the airfield. **(T-0)** Bird Hazard Working Group members shall evaluate the risk of current vegetation on the installation and determine compatibility with aviation safety. **(T-2)** This includes plants that are already established within airfield and non-airfield portions of the installation. Existing, incompatible vegetation should be prioritized by risk and mitigated accordingly. **(T-3)** Civil Engineers will ensure that all airfield vegetation projects and other installation landscape designs are coordinated/approved by the Bird Hazard Working Group. **(T-3)**

3.2.1.2. Vegetative cover within the Aircraft Movement Area shall be maintained at a height between 7 to 14 inches and converted to locally adapted vegetation species deemed unattractive to birds and other wildlife. **(T-2)** At a minimum, maintain the vegetative cover at the above prescribed height 500 feet beyond the Aircraft Movement Area boundary where able. **(T-2)** It is highly recommended to maintain vegetation located inside the security fence that allows unimpeded access to the Aircraft Movement Area at 7 to 14 inches to remove cover for large and small mammals. The 7 to 14 inch standard is designed to minimize mowing frequency and improve growing conditions while providing minimal wildlife attraction. Vegetative cover between 7-14 inches discourages flocking species from foraging on the airfield as reduced visibility disrupts bird inter-flock communication and flock integrity by reducing the ability to detect and respond to predators. Vegetative cover exceeding 14 inches may attract some ground nesting birds and provide cover or food for rodents that may in turn attract predatory birds and mammals. Vegetative cover exceeding 14 inches will also provide cover for larger animals (deer, coyotes, turkeys, etc.) making them difficult to detect and remove. Although Bahia grass and many other grasses may produce prominent seed stalks, the height of these seed heads should not be the sole reason for mowing. As turf grass will eventually go to seed, mowing to eliminate seeding will increase mowing cycles. Coordinate mowing with periods of low flight activity. Begin mowing adjacent to runways and finish in the infield or outer most vegetation areas. This will cause insects and other animals to move away from aircraft takeoff and landing areas. Additionally, avoid mowing vegetation shorter next to the runway than in other areas as much as possible. Alternate the directional pattern of mowing to prevent the development of ruts and subsequent ponding of water.

3.2.1.2.1. Vegetative cover is not to exceed 7 inches within 10 feet surrounding all airfield navigation aids or visual air navigation facilities (e.g. instrument landing system, tactical air navigation, lighting, signage, etc.) regardless of their location within the Aircraft Movement Area. **(T-2)**

3.2.1.2.2. Keep broad-leafed weeds to a minimum on the airfield. Non-uniform plant species create an attractive mosaic of both lateral and vertical dimensions. Eliminating weeds and cultivating a uniform monoculture of grasses may be more effective in discouraging seed-eating birds from feeding on the airfield than mowing grass seed stalks. Apply herbicides as practical to control weeds and comply with AFI 32-1053, *Integrated Pest Management Program*. Broad-leafed plants attract a variety of wildlife, may produce seeds or berries, and may limit grass growth while providing increased cover. Growth retardants should be tested on small test plots before use on areas in general. Ensure faster growing weeds are cut before they go to seed to discourage seed eating birds from using the airfield. Primary focus shall be on vegetation height and weed seed heads. Most grass seeds found on the airfield are less desirable as food than available weed seeds.

3.2.1.2.3. Reduce bare areas within the Aircraft Movement Area. Such habitats expose grit (sand and small stones), seeds, and invertebrates that are easily exploited by birds. Birds ingest grit to aid in digestion of seeds. Several bird species with plumage and egg color patterns matching that of graveled bare ground also seek this habitat for loafing and nesting. Lack of vegetative cover also allows flocking species to maintain visual communications and aids in predator detection, allowing them to feel safe on the airfield. Bare areas are often the result of soil disturbances (i.e., construction projects or jet wash) and/or poor soil conditions. Ensure all ground disturbances on the airfield are followed by efforts to vegetate denuded areas as soon as possible. Plant grasses that are compatible with aviation safety and adapted to poor soils where applicable. Bare areas may require additional soil amendments (e.g., on site composting, fertilizer, lime, or gypsum) and soil stabilization materials (e.g., hay mulch, erosion blankets) to produce an adequate stand of vegetation. If supplemental irrigation is available, irrigate only until new vegetation is established. Encourage off-road vehicle operators to rotate travel paths taken through airfield vegetation; this reduces the occurrence of dirt paths created by tire compaction of soil or rutting. Avoid mowing saturated soils. Inattention to this will result in soil compaction and deteriorating vegetation density/health. Rutting will also result and lead to standing water, erosion, and problematic weeds. Rutting further denudes shallow soils of existing vegetation, taking years to recover. Eliminating bare areas on the airfield denies access to grit and forces birds to seek sources elsewhere.

3.2.1.2.4. Fertilize established vegetation as necessary to stimulate growth and promote a uniform cover. Rate and frequency of application may vary from other semi-improved vegetation areas and should be based on soil test results.

3.2.1.2.5. Installations located in arid climates where conditions do not support turf growth may develop natural vegetation on the airfield to limit attractiveness to wildlife. The endemic vegetation shall not supply attractive habitats for hazardous wildlife or obstruct views of the airfield from the tower. These situations require comprehensive vegetation/wildlife hazard management and will be reviewed on an individual basis by AFSEC/SEFW for vegetation waiver approval by AF/SE (or designee). **(T-1)** Another option for airfields in low-moisture environments is de-vegetation through a technique commonly known as blading. However, there may be unintended long-term risks associated with blading. Dust suppression agents should

be evaluated prior to application so as not to create a Foreign Object Damage (FOD) hazard on the airfield. Consult and plan with MAJCOM and Air Force Civil Engineering Center specialists prior to implementation.

3.2.1.2.6. Installation safety offices may request an airfield vegetative height restriction waiver from AFSEC/SEFW after MAJCOM's coordination.

3.2.1.2.7. Trees and brush on airfields create cover, food, and nesting resources for wildlife increasing attractiveness to species hazardous to flight operations. Formal wildlife surveys and/or local Bird/wildlife Aircraft Strike Hazard Specialists will help substantiate what type of action is warranted. Should a stand of trees contain birds protected by the Bald and Golden Eagle Protection Act, 16 U.S.C. 668-668d (or any other species protected by the Endangered Species Act), coordinate with Natural Resources and contact the United States Fish and Wildlife Services to determine whether a permit is required prior to any tree removal. **(T-0)**

3.2.1.2.8. Increased Bird/wildlife activity is often found where vegetation types change from forests to brush, or brush to vegetation (edge effect). To reduce these wildlife hazards, keep edge effects on the airfield to a minimum, or as far from the active runway as possible. This eliminates the cover many birds and rodents require. Single trees or snags (dead standing trees) on an airfield provide perches for hawks, owls, or other bird species. Biodiversity practices will not be implemented on the Wildlife Exclusion Zone when such practices are deemed hazardous to aviation. **(T-2)** The more diverse an airfield is in terms of vegetative species and structure, the more attractive it will likely be to a variety of birds/wildlife.

3.2.1.2.9. Vegetation cover type may attract large populations of insects and may pose an indirect threat to safe flight operations. Consider the benefits of aerial spraying for insect control on the airfield to supplement ground spraying by local pest management personnel. Consult with Air Force Civil Engineering Center/Civil Branch (AFCEC/COSC) prior to any aerial spraying operations.

3.2.1.3. Airfield Fencing. Proper fencing reduces airfield incursions by terrestrial wildlife. The best procedure for keeping large mammals off the airfield is an adequate fence. An 8-foot chain link fence with 3-strand barbed outriggers and secured at the ground will keep most mammals off the airfield. A 4-foot skirt of chain link fence material, attached to the bottom of the fence and buried at a 45 degree angle on the outside of the fence will prevent animals from digging underneath, while reducing washouts. Rebar offers a cost effective solution when patching gaps under a fence to prevent wildlife from entering the airfield. Heavy gravel may be used to armor fence bottoms. The airfield perimeter security fence shall be patrolled, at least monthly, looking for washouts, breaks, or other compromises in the fence. **(T-3)** Coordinate patrols with appropriate installation agencies to avoid duplication of effort. Repair breaches upon detection. **(T-3)** Remove vegetation on and along the fence line wherever noted. **(T-3)** Maintain a buffer zone free from brushy and woody vegetation on both sides of the security fence where able. This practice will help maintain the integrity of the fence by allowing easier access for inspection and maintenance as well as discouraging the growth of woody vegetation on and through the fence. Inspect all gates to ensure proper function. Replace or repair all damaged gates or gates that do not close

properly. **(T-3)** Install speed humps under gates to control erosion and reduce gaps at the bottom if necessary. Post signs warning of wildlife hazards to flight operations to educate gate users if gates are routinely left unsecured. **(T-3)** Ensure fences do not violate the airfield clear zones and frangibility rules, in accordance with United Facilities Criteria 3-260-01, *Airfield and Heliport Planning and Design*. **(T-0)**

3.2.1.4. Airfield Drainage. Fresh water is one of the most attractive features to birds/wildlife on an airfield, especially in arid regions and near the seacoast. Standing fresh water creates a source of drinking and bathing water and a breeding place for insects, amphibians and other food sources for birds/wildlife. For further mitigation strategies for airfield drainage, reference Federal Aviation Administration Advisory Circular 150/5320-5D, *Airport Drainage Design*.

3.2.1.4.1. Ephemeral (temporary) water sources, such as ponding, are typically shallow depressions that temporarily collect and hold water. This standing water is an attractant to several hazardous bird groups such as gulls, wading birds, shore birds, and waterfowl. When conducting formal wildlife surveys, examine conditions of the airfield, infrastructure, and habitat especially following a significant rain event. Document all low areas retaining water for more than 48 hours and immediately report problematic areas to the appropriate installation agency for resolution. In instances where repairs or drainage improvements are delayed, harassment, exclusion, depredation, or the use of repellents may be warranted. Since federal and state laws strictly control wetlands, coordination with Civil Engineering is required before making any modifications to airfield drainage. However, non-tidal drainage and irrigation ditches excavated on dry land are not generally considered to be "waters of the United States" (51 Code of Federal Regulation 41206, *Final Rule for Regulatory Programs of the Corps of Engineers*) and, therefore, are not considered wetlands. See Memorandum of Agreement in the attachments section.

3.2.1.4.2. Drainage ditches shall be maintained to exclude vegetation. **(T-2)** Aquatic vegetation, trees and brush along and within drainage ditches provide excellent habitat for a variety of Bird/wildlife species in the form of perching, loafing, and nesting areas, along with providing food and cover. Vegetation will also impede water flow through a drainage ditch prolonging the water attractant and aid in the process of sediment buildup. Wading birds, such as herons, egrets, and shorebirds, are less likely to utilize deep and steep sloped drainage ditches. Grade the banks of drainage ditches to allow mowing to the edge of the ditch. Construct airfield drainage ditches as deep as possible to limit the surface area of the water while allowing proper drainage in accordance with civil engineering directives. **(T-2)** When designing new ditch projects, or where otherwise possible, alter open drainage ditches into enclosed and buried culvert systems.

3.2.1.5. Exclusionary Devices (e.g. spike strips). All structures on an airfield may potentially serve as perching, loafing, nesting, and roosting locations for many species of birds. Raptors especially favor structures that give them a height advantage when hunting. If structures are being continually used as perching locations, install exclusionary devices.

3.2.1.5.1. Identify airfield structures used as perching sites. Remove all obsolete structures. **(T-3)** Determine which type of exclusionary device is best for the different structures found on an airfield. Procure and install exclusionary devices on high-use areas to include runway distance markers, ledges, rafters, signs, and other roosting and perching areas to mitigate bird utilization. Exclusionary devices are not 100% effective against all bird species, but may significantly reduce the number and type of species that utilize airfield structures. Proper installation and routine maintenance of exclusionary devices will assure effectiveness and decrease possible Foreign Object Damage (FOD) hazards.

3.2.1.5.2. Hangars and shade shelters provide an attractive environment for birds to nest and roost. Bird issues in hangars should be given special attention due to the potential health risks and unsanitary conditions generated by an accumulation of bird feces and bird mites. Hangars are easily accessible to birds since hangar doors are often left open for extended periods, particularly in the evenings when birds are roosting. Keeping hangar doors closed is the best preventative method but is sometimes impractical (closing doors one hour before sunset and then re-opening them after dark to reduce roosting/nesting behavior may be an option for some facilities). As a result, exclusionary devices, full-time bird control, or depredation are often necessary. Utilizing brush weather seals on the edge of hangar doors will remove gaps and seal any open spaces, restricting entry points to birds. Strip plastic curtains, or vertical blinds, allows the hangar doors to remain open for ventilation while limiting access to birds. Though expensive, netting provides an excellent long-term defense against birds returning to hangars and shade shelters to roost or nest. Netting will prevent birds from roosting inside a hangar while allowing the doors to be open during hangar operations. It may not be necessary to net the entire hangar. "Spot" netting (netting only certain highly attractive nesting/roosting areas or areas above high value assets) may be a less expensive option; conducting surveys, observing fecal matter accumulations, and conversations with human inhabitants will help identify areas highly attractive to birds. Exclusionary netting should be programmed into hangar/shade shelter repair or new construction costs whenever possible that decreases the expense of this option. Lining hangar rafters with Poly-vinyl Chloride pipes has proven successful in keeping birds from nesting or roosting. By reducing the amount of surface area available, birds are prone to look for other structures on which to build nests or roost. The use of air rifles for depredation has proven successful when other options are not available or have failed within hangars. See paragraph 3.2.2.4.3 for further information on air rifle use.

3.2.1.6. Agricultural Programs. While not generally recommended, a few installations have agricultural programs on or surrounding the respective airfield to reduce maintenance costs. These programs range from crop and hay out leases to grazing and reforestation. The types of crops grown and the agricultural methods used may have significant effects on local bird populations.

3.2.1.6.1. Do not cultivate grain crops within 1,000 feet of runways, as growing plants and harvest methods expose a ready food supply. **(T-2)** Hay, cotton, and flax are the least attractive crops to wildlife. Anything that makes the airfield unique may attract birds/wildlife. Therefore, airfield crops must not be radically different from

crops found in the surrounding community. Cultivation may attract birds by exposing large numbers of insects and earthworms. Hay crops should not be allowed to lay down on the ground for prolonged periods of time (48 hours or longer), or store bales on the airfield, as this may kill underlying vegetative cover creating bare areas. Also, invertebrates and small mammals will tend to congregate in the resulting excess cover.

3.2.1.6.2. Harvesting and planting schedules may affect wildlife activity on or surrounding an airfield. For example, if an airfield hay crop is harvested before or after other hay crops in the local area; large numbers of invertebrates may be exposed on the airfield before being exposed in other fields. This may provide a more intense bird attractant than would normally exist.

3.2.1.6.3. The flying schedule should account for local agricultural activities. Planting, cultivating, harvesting, or burning may temporarily increase airfield bird attractants. Airfield management, safety, and civil engineering personnel should be aware of local agricultural methods and determine if they could negatively impact flight safety. Refer to AFI 32-7064, *Integrated Natural Resources Management,* and consult with local Civil Engineering for further guidance regarding agricultural practices on and surrounding the airfield.

3.2.1.6.4. Grazing animals represent a serious hazard to flight operations. Livestock shall not be allowed to graze on active airfields. **(T-2)** Ensure the use of strict animal control and proper fencing to maintain separation of wildlife, livestock, and aircraft. **(T-2)**

3.2.1.7. Wastewater Facilities, Lagoons, and Ponds. Waterfowl and shorebirds are attracted to wastewater holding ponds and treatment facilities. Birds utilize water for resting as well as a food source. Wastewater lagoons are most attractive in arid climates. Installations must consider flight operations when designing and locating wastewater ponds, and locate any new open water features or ponds as far from the runway and traffic patterns as possible. Consider pond placement to ensure transiting birds do not cross runways. Ponds designed with steep sides, impervious liners, little surface area, and little to no vegetation will provide reduced bird attraction. If pond alteration or relocation is not feasible, consider installing aeration pumps, agitation equipment, fountains, plastic bird balls/discs or grid wires (placed over the water body) to dissuade birds from utilizing holding ponds and lagoons. If spray fields are utilized, consider discharging sewage effluent during reduced flying operations. Consider constructing and utilizing Rapid Infiltration Basins as a means to quickly remove water attractants where sandy soils occur. Refer to AFI 32-7064, *Integrated Natural Resources Management,* and consult with local Civil Engineering for further guidance regarding placement of lagoons and ponds on the airfield.

3.2.1.8. Landfills. Solid waste landfills are a significant attractant to hazardous bird species. Operate disposal sites according to AFI 32-7042, *Waste Management*; Federal Aviation Administration Advisory Circular 150/5200-34A, *Construction or Establishment of Landfills Near Public Airports*; FAA AC 150/5200-33B, *Hazardous Wildlife Attractants on or Near Airports*; 40 Code of Federal Regulations 258, *Criteria for Municipal Solid Waste Landfills;* and state laws. Resolve, remediate or relocate

landfills that do not meet regulatory guidelines/laws. **(T-0)** If the landfill continues to lure wildlife, ensure the site is as unattractive to wildlife as possible.

3.2.1.8.1. Consider the following methods to minimize the attractiveness of landfills: maintain a small working face to minimize exposed wastes; cover waste material immediately (as a minimum, cover the working face daily with 6-8 inches of topsoil or other commercial cover); operate the landfill as a pit or trench to limit access to birds; dump waste at night or during non-flying periods; discourage gulls and other birds with overhead wire barriers; relocate putrescible/organic wastes to a more remote landfill; use bioacoustics and pyrotechnics to frighten birds away; finally, consider incinerating waste.

3.2.1.8.2. USAF cannot control land use off base; however, before landfills may be opened or altered (e.g. increase in size or height), the landfill operator must obtain all mandated operations permits per applicable laws and ordinances. States or local governments normally convene a summit regarding the potential environmental impact of any proposed landfill site. USAF concerns about potential wildlife hazards shall be presented at these summits. **(T-3)** Applicable personnel from the Bird Hazard Working Group should work jointly to represent USAF interests. **(T-3)** AFSEC/SEFW will assist by providing consultation and expert testimony as needed. In the event that an off-installation landfill creates wildlife hazards, installation personnel should work with and assist landfill managers in ensuring wildlife are routinely dispersed. USAF personnel or contracted installation wildlife hazard specialists may enter landowner agreements with landfills or other non-federal lands to directly mitigate wildlife hazards.

3.2.1.9. The cooperation of the community is also necessary when new projects are considered in the local area. Projects off the installation, must be considered when a potentially hazardous wildlife attractant is being proposed. The installation Bird/wildlife Aircraft Strike Hazard program manager, with the assistance of public affairs shall incorporate public education activities in the vicinity of the installation. **(T-3)** The program manager shall work with local and regional planning and zoning boards so as to be aware of proposed land-use changes, or modification of existing land uses, that could create hazardous wildlife attractants. **(T-3)** Pay particular attention to proposed land uses involving creation or expansion of waste water treatment facilities, development of wetland mitigation sites, or development or expansion of dredge spoil containment areas. At the very least, the program manager shall ensure they are on the notification list of the local planning board or equivalent review entity for all communities located within 5-miles of the installation, so they will receive notification of any proposed project and have the opportunity to review it for attractiveness to hazardous wildlife. **(T-3)**

3.2.2. Active Controls for Short-Term Relief of Wildlife Hazards. Birds and other hazardous wildlife on runways, taxiways, or infields create a safety hazard and shall be dispersed or removed to facilitate safe flying operations. **(T-2)** Utilizing a combination of different dispersal tools may provide the best line of defense for immediate hazards. Pyrotechnics, bioacoustics, depredation, and other methods have been effective in dispersing wildlife from airfields. When used together (or in an alternating manner), these techniques may complement each other's effectiveness over time. A depredation permit is not required for non-lethal harassment of migratory birds on the airfield according to 50 Code of Federal

Regulation 21.41, *Depredation Permits*. For purposes of the Endangered Species Act, US Fish and Wildlife Services shall be consulted prior to the use of pyrotechnics if they will disturb any federally listed threatened/endangered species. **(T-0)** Authorized Bird/wildlife Aircraft Strike Hazard equipment is listed on the Bird/wildlife Strike Hazard website.

3.2.2.1. Pyrotechnics. Pyrotechnics are explosive noise-producing projectiles that under the appropriate situation will effectively disperse many species. However, these devices are not effective against all species and use may be extremely limited under red flag fire advisories or when dry vegetation is abundant. Wildlife will often habituate to pyrotechnics over time if not reinforced with lethal control. Coordinate active control methods with appropriate agencies (such as the Tower Supervisor, Airfield Management, Command Post, Public Affairs, and Security Forces) prior to initiation. **(T-3)** The agency storing and using pyrotechnics shall follow guidelines outlined in AFI 21-201, *Munitions Management* and AFMAN 91-201, *Explosives Safety Standards*. **(T-2)** Check for additional host nation storage requirements and instructions when assigned to overseas locations.

3.2.2.1.1. Three types of centrally managed pyrotechnics are authorized and available through supply. All three cartridges are relatively inexpensive and effective to a range of approximately 200 feet. Supervisors will ensure personnel using these bird scare cartridges are fully trained and aware of the manufactures operating procedures. **(T-3)** There are only two authorized types of 15mm scare cartridges; "bangers" and "screamers." The 12-gauge scare cartridge and 15mm banger provide a loud report, whereas the 15-mm screamer creates a shrill whistle.

3.2.2.1.2. The only Commercial-Off-The-Shelf (COTS) pyrotechnic authorized for use by AF personnel is the Cartouche Anti Peril Aviaire (CAPA) cartridge. Operating procedures for the safe use of the cartridge may be found on the Bird/wildlife Aircraft Strike Hazard website (Air Force Portal/Safety/Bird/wildlife Aircraft Strike Hazard). Commercial-Off-The-Shelf items may be purchased using a Government Purchase Card. AFI 64-117, *Air Force Government-wide Purchase Card (GPC) Program* authorizes the purchase of Bird/wildlife Aircraft Strike Hazard munitions with a Government Purchase Card. Coordinate purchase through the installation commander referencing AFI 21-201, *Munitions Management,* paragraph 7.3.8.3.

3.2.2.2. Acoustic Harassment. Acoustic harassment consists of broadcasted wildlife distress calls (bioacoustics), propane cannons, long range acoustic devices, and horns/clappers. Differing techniques may create various responses (both desirable and undesirable) depending on the species of bird being harassed. Some calls will attract, while others may repel. For this reason, the sound source must be properly placed to direct the species away from the runway. Coordination of acoustic harassment with current flying operations is critical. Coordinate with airfield management, air traffic control and installation security forces before using acoustics. **(T-3)** Depending on physical factors such as terrain, trees, and structures on the airfield, the effective distance from the problem species will vary. Consult with the United States Fish and Wildlife Services if the use of acoustics will have an impact on a federally listed threatened/endangered species. **(T-0)**

3.2.2.2.1. Avian distress calls (bioacoustics) are normally broadcasted from a vehicle-mounted source for ease of mobility. Avian distress calls may be of limited use. A variety of calls may be attempted to determine the most effective selection for a particular species. Distress calls are typically the most effective. However, some bird species do not respond to distress calls at all. Only use bioacoustics when birds are actually present, as continuous use will lead to rapid habituation and ineffective results. The effectiveness of distress calls is dramatically increased when combined with other hazing techniques (pyrotechnics). Birds may react to calls by flying toward, circling, and gradually moving away from the source. Such behavior may induce a temporary hazard. Hazards to flying operations may be alleviated by utilizing techniques prior to commencing daily flying activities or during breaks in flight activities. Gulls, starlings, blackbirds, and crows are usually effectively dispersed with distress tapes. Occasionally, recorded distress calls of different bird species will frighten a variety of birds; however, species-specific distress calls are the most effective.

3.2.2.2.2. Propane cannons and other mobile long-range acoustic devices may be successful if used sparingly and randomly. These devices are not effective against all species and should be used with other harassment techniques such as pyrotechnics and depredation. These devices may be very effective when moving roost sites of gregarious birds, such as egrets and blackbirds. For airfield applications, relocate mobile cannons or maintain an adequate constellation of fixed cannons to avoid habituation. Many bird species will quickly habituate to acoustic devices if operated continuously or for long periods of time in the automatic mode. In coordination with air traffic control, a few acoustic devices strategically positioned and operated by the Bird/wildlife Aircraft Strike Hazard Team, may provide great benefit at a reduced cost. It is highly recommended that propane cannons are controlled remotely and not left to report automatically. This will reduce the risk of inadvertently scaring birds into the flight path of aircraft and decreases habituation to the stimulus.

3.2.2.2.3. Employing air horns, vehicle horns and “clappers” (hinged pieces of wood 2x4’s with handles) are the most basic active harassment to disperse wildlife. The range and effectiveness of these instruments is severely limited but may be employed in areas that are not conducive to the use of pyrotechnics and firearms.

3.2.2.3. Use of avian lasers to non-lethally harass wildlife may prove effective depending on the types of species (pigeons, vultures, and geese), but are only effective in low-light conditions. Consult with the Bird/wildlife Aircraft Strike Hazard Team to identify which avian lasers are currently authorized for use within USAF facilities or properties for wildlife hazard mitigation.

3.2.2.3.1. The Installation Laser Safety Officer (ILSO) must conduct a Hazard Evaluation IAW AFI 48-139, *Laser and Optical Radiation Protection Program* before allowing use of approved avian lasers. **(T-2)** This assessment will be documented accordingly, and be kept on file by the installation laser owning agency and Installation Laser Safety Officer. **(T-3)**

3.2.2.3.2. All wildlife control personnel who operate within USAF facilities or properties must comply with the current operating procedures when using approved

avian lasers. **(T-1)** The most current operating procedures may be found on the Bird/wildlife Aircraft Strike Hazard Team's Portal site (Air Force Portal/Safety/Bird/wildlife Aircraft Strike Hazard).

3.2.2.3.3. Overseas airfields shall comply with host nation's Aviation Department regulations pertaining to the use of hand-held lasers for wildlife hazard mitigation prior to implementation of lasers. **(T-0)**

3.2.2.4. Depredation. Pyrotechnics and bioacoustics will not provide adequate wildlife management in all scenarios. Some species will habituate to non-lethal techniques, while others seem naturally immune to such techniques. When used judiciously, lethal shooting may reinforce non-lethal techniques and increase efficacy of dispersal efforts. Depending on the species and scenario, lethal shooting alone may be more effective than non-lethal techniques or vice versa. Merely dispersing wildlife populations will not always resolve the issue and there may be times that warrant significant population suppression to safeguard aviation. Depredation may also be required for a number of reasons other than the direct re-enforcement of active controls (e.g. population control, removal of sick/injured animals, emergency situation, etc.). All installations shall maintain the organic capability to carry out harassment depredation of birds and/or wildlife as required in the event birds and/or wildlife pose an immediate threat to aircraft; birds and/or wildlife do not respond to other control methods; resident populations of birds and/or wildlife reach such levels that population reduction is required in the interests of flight safety; sick or injured birds and/or wildlife are present and cannot be dispersed or removed via other methods; or if an emergency situation arises. **(T-1)** Wing Commanders shall designate personnel from Bird/wildlife Aircraft Strike Hazard involved agencies as sub-permitted on the United States Fish and Wildlife Services issued depredation permit. **(T-1)** Ensure additional host nation restrictions, requirements, and instructions are complied with when assigned to overseas locations.

3.2.2.4.1. When conducting depredation operations in U.S. territory, a federal depredation permit, available from the United States Fish and Wildlife Services, is required before lethal removal of any migratory or federally protected species. **(T-0)** The application for the depredation permit is a United States Fish and Wildlife Services Form 3-200-13, *Federal Fish and Wildlife Permit Application Form*, and shall be accompanied by the information requested by the United States Fish and Wildlife Services information sheet in accordance with 50 Code of Federal Regulation 21.41. **(T-0)** The United States Department of Agriculture Wildlife Services Form 37 shall also be completed and submitted**. (T-0)** Approved depredation permits for Bird/wildlife Aircraft Strike Hazard program management will be maintained by the manager, however, it is highly recommended that the office conducting the depredation hold a permit. **(T-3)** The Bird/wildlife Aircraft Strike Hazard program manager will apply for permits and maintain records associated with harassment and depredation activities. A copy of the permit shall be carried whenever exercising depredation authority. **(T-0)** Multiple depredation permits may be acquired by an installation for varying functions (flight line safety, entomology, and natural resources). **(T-0)** Document wildlife records management requirements with Natural Resources or environmental personnel in the Bird/wildlife Aircraft Strike Hazard Plan. Migratory bird depredation permit holders are required to

exercise non-lethal control techniques prior to employing lethal control measures. **(T-0)** However, this does not imply non-lethal control should be used in futility, when deemed least effective or ineffective, for the species or scenario. Bird/wildlife Aircraft Strike Hazard Programs shall ensure effective measures are being implemented in order to safeguard aviation. Species may only be taken in conjunction with a continuing non-lethal control program. Unless otherwise directed, carcasses, nests, and eggs taken under permit authority shall be completely destroyed by burial or incineration. **(T-0)** No federally listed threatened or endangered species, Bald or Golden Eagles, or their nests and/or eggs may be taken unless specifically authorized by permit. **(T-0)** Federally listed endangered species may not be intentionally killed. **(T-0)** Harassment of a federally listed endangered species requires a specific permit and in the event that is not successful, the installation should work with United States Fish and Wildlife Services to explore options to include possible relocation. **(T-0)** European Starlings (*Sturnus vulgaris*), House Sparrows (*Passer domesticus*), Rock Doves/domestic pigeons (*Columba livia*), Eurasian Collared Doves (*Streptopelia dacaocto*) and some other species (see *Migratory Bird Treaty Act*, as amended (16 U.S.C. §703 et. seq.)) are not federally protected in the United States and require no federal depredation permit. When granted, the permit will specify the species, the numbers of species that may be taken, and the technique used. If the initial quota is reached for a specific species before the end of the permit year, contact the United States Fish and Wildlife Services for modification of the permit to increase take. Some states may require additional permits for the take of state protected species. Coordinate with the United States Fish and Wildlife Services, installation environmental flight and legal offices when obtaining permits. **(T-0)** See also Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*.

3.2.2.4.2. A permit is not needed to lethally control specific species of blackbirds, crows, and magpies. In accordance with 50 Code of Federal Regulation 21.43, *Depredation Order For Blackbirds, Cowbirds, Grackles, Crows, and Magpies*, it is not necessary to obtain a federal permit to control the above listed species if they are committing or about to commit depredations on ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner that they are a health hazard or other nuisance. Exercise care when identifying birds as other species within the family Corvidae (such as the Common Raven, Jays, and Tamaulipas) are protected under the Migratory Bird Treaty Act (MBTA) 16 U.S.C. 703-712. Provide a count of each species taken in an annual report to the Regional Migratory Bird Permit Office. **(T-0)** Always check with current federal and local authorities before taking lethal action to ensure legality and avoid liability, as species protection list may change over time.

3.2.2.4.3. Use of air rifles and centrally managed/supplied shotguns to remove birds and small mammals has proven successful. Air rifles are an inexpensive control technique. The USAF Small Arms Team does not classify air rifles as firearms; however, air rifles are controlled items that must be handled in accordance with AFI 31-101, *Integrated Defense*, and require secure storage. Air rifles have proven effective in controlling roosting populations of pigeons, starlings, and house sparrows

within hangars and other infrastructure, as well as rabbits and prairie dog colonies within airfield environments. Shotguns are ideal for removal of airborne species or larger mammals. The Bird/wildlife Aircraft Strike Hazard 870 shotgun is capable of deploying all centrally managed 12-gauge munitions (ammunition and pyrotechnics) as well as all pre-approved 12-gauge commercially available ammunition. Each installation with a Bird/wildlife Aircraft Strike Hazard program will procure two shotguns to support their Bird/wildlife Aircraft Strike Hazard program and maintain internal capabilities. **(T-3)** Installations with additional need may obtain authorization for more than two shotguns. AFI 31-101, *Integrated Defense (FOUO)* addresses categorization and storage requirements of firearms, their major subassemblies, and associated ammunition. Firearms storage facilities shall be designated as controlled areas and approved by the Installation Commander or designee. **(T-2)** Refer to AFMAN 91-201, *Explosives Safety Standards,* for storage site licensing requirements for munitions. Confer with local, state, and federal wildlife authorities, as applicable, before initiating removal operations (see paragraph 3.2.2.4.1). See Bird/wildlife Aircraft Strike Hazard website for authorized weapons and munitions.

3.2.2.4.4. Each installation with a Bird/wildlife Aircraft Strike Hazard program will designate and train personnel in wildlife dispersal and depredation regardless of the severity of the hazards present. **(T-2)** As required by AFI 36-2654, *Combat Arms Program,* anyone participating in an installation depredation program shall attend and receive certification through the approved Combat Arms shotgun class or National Rifle Association certified, hunter's safety, or gun handling safety course if Combat Arms is unavailable. **(T-2)** Contact the installation's rod and gun club or Morale Welfare Recreation (MWR) for information on installation organized hunter safety programs, or contact the local game agency and their administrator for hunter safety courses in the area. In the absence of an assigned Bird/wildlife Aircraft Strike Hazard specialist, appropriate installation Civil Engineers (e.g. Environmental, Natural Resources, Pest Management, etc.) will provide training in wildlife identification for all sub-permittees listed on the depredation permit. **(T-2)** Ensure trainees are also trained in any additional legal restrictions or requirements (such as lead ammunition prohibition) as applicable. All training must be adequately documented within the installation's Bird/wildlife Aircraft Strike Hazard Plan. **(T-3)**

3.2.2.4.5. Coordinate with airfield management, air traffic control, command post, public affairs, fire control, supervisor of flying (where able) and installation security forces before utilizing firearms for pest management. **(T-3)**

3.2.2.4.6. When appropriate, wear appropriate identifying outerwear while conducting Bird/wildlife Aircraft Strike Hazard operations (for example: blaze orange vest labeled "Bird/wildlife Aircraft Strike Hazard", "AIRFIELD MGT", "Civil Engineering", etc.).

3.2.3. Other Bird/wildlife Management Methods. Other Bird/wildlife management techniques are discussed below. It is important to note wildlife management practices are evolving, therefore this not an all-inclusive list.

3.2.3.1. Trapping and Relocation. If harassment techniques and depredation prove ineffective, consider trapping and relocating/depredating problem species. However, relocation is not always a biologically sound, effective, or permanent management strategy; and shall only be used for legitimate scientific, legal, or biological reasons. Many states have restrictions that prohibit and regulate the relocation of animals and birds. The spread of certain wildlife diseases and spread of numerous invasive species have in part, been due to relocation efforts of well-intended individuals. Personnel shall confer with all appropriate local, state, and federal agencies before relocating an animal/bird outside installation boundaries. **(T-0)** In an airfield environment, wildlife that return to the original capture sight can pose considerable threats to aviation. Conduct this mitigation method only with trained personnel and appropriate permit requirements. A justifiable, well executed, relocation program may decrease wildlife hazards to aircraft and aircraft hazards to wildlife; and enhance public relations by illustrating the program's mutual benefit to wildlife and aviation.

3.2.3.2. Effigies. Effigy use (displaying taxidermy or replica carcasses in distressed positions) has proven extremely effective in relocating roosting congregations of specific bird species (vultures, crows, and ravens) with minimal harassment and depredation. Effigies should be used sparingly and relocated often. Utilize Public Affairs to educate the community about effigy use, minimizing effects on non-target species, and ultimately the enhancement of combat capability. Consult with state and federal authorities before considering displaying effigies, as possession of some carcasses may require permit authorization.

3.2.3.3. Avian radars. Avian radars are systems specifically designed to detect hazardous wildlife that are currently airborne in the vicinity of an airfield or specified low-level airspace. Avian radars are approved for use on USAF airfields and ranges provided they are fielded in accordance with the Unified Facilities Criteria 3-260-01, *Airfield and Heliport Planning and Design,* and in coordination with the Installation Radiation Safety Officer. Applications of the avian radar may include airborne wildlife movement monitoring, detection of attractive habitats through wildlife movements, harassment and depredation, Bird Watch Condition determination (nighttime hours), and flying window alteration. Coordinate system installment and utilization methods for inclusion in Airfield Operations Instruction and Bird/wildlife Aircraft Strike Hazard Plan.

3.2.3.4. Birds of Prey/Avian Programs. A bird of prey program is not limited to the use of falcons only; several birds of prey species may be utilized. Birds of prey trained for airfield Bird/wildlife dispersal may be effective when used in combination with other hazing techniques. Deploying birds of prey usually disperses birds immediately from the airfield and these birds are likely to remain away from the airfield for longer periods. Birds of prey inherently scare other birds; as a result, there is little habituation to the threat. However, there are limitations to bird of prey programs. Bird of prey programs may be labor intensive, and there is potential for bird strikes associated with the birds of prey themselves. Birds of prey may be flown only during daylight hours and cannot be flown in extreme weather conditions, after feeding or while molting. Additionally, most birds of prey available for use in continental United States are ineffective in dispersing large waterfowl (particularly geese), and other birds of prey from an airfield. Ensure programs that include birds of prey incorporate all legal integrated pest management

methods through delineation in the contract performance work statement and in the local Bird/wildlife Aircraft Strike Hazard Plan. **(T-2)**

3.2.3.5. Canine Programs. The use of Border Collies or other breeds of dogs to disperse geese and ground nesting birds is effective under certain circumstances. A dog demands full-time attention making it more advantageous to contract the services of a dog and its handler rather than purchasing a dog. While a dog may be very effective at dispersing geese from an airfield, it may prove ineffective at removing geese from bodies of water, or other species of birds from the airfield (especially gulls and grassland birds). Dogs may be effective in dispersing other forms of wildlife depending on the species. Ensure programs that include canines incorporate all legal integrated pest management methods through delineation in the contract performance work statement and in the local Bird/wildlife Aircraft Strike Hazard Plan. **(T-2)**

3.2.3.6. Radio Controlled Vehicles. Use of radio controlled aircraft, dune buggies, or boats to disperse wildlife have shown significant results. A radio controlled craft may be maneuvered to guide birds on a flight path away from the airfield and offers continued harassment while birds are in flight. Radio controlled boats may harass birds on large ponds where pyrotechnics cannot reach the birds due to range considerations or human activities (e.g. golf courses). Radio controlled wheeled-vehicles may effectively disperse wildlife from grassy areas, particularly office buildings or housing where the use of pyrotechnics or bioacoustics is undesirable. Radio controlled vehicles may require skilled operators and coordination with multiple agencies on base prior to use.

3.2.3.7. All-terrain Vehicles (ATVs). Use of all-terrain vehicles in the airfield environment has proven useful in dispersing birds/wildlife from the airfield environment. Many airfields have areas that are difficult to navigate, even with 4x4 vehicles, making ATVs an attractive alternative. Supplementing ATV use in large areas with pyrotechnics has proven successful. An ATV may follow other birds/wildlife through terrain that one could not otherwise traverse. Caution must be exercised when approaching certain wildlife species. Ensure personnel are properly trained in specific local wildlife behavior before attempting to disperse via this method due to dangers associated with operating in close proximity to potentially aggressive wildlife, and the possibility of moving wildlife into aircraft flight paths. **(T-3)** Before operating an ATV, ensure personnel complete an approved ATV rider safety course within the guidance of AFI 91-207, *The US Air Force Traffic Safety Program,* that requires ATV training to be conducted by a certified Specialty Vehicle Institute of America (SVIA) individual. **(T-3)** Exercise caution when operating ATVs in areas saturated with water, as tires may cause airfield rutting and future ponding issues.

3.2.4. Ineffective Methods of Bird/wildlife Management. Ineffective methods of Bird/wildlife management are discussed below. It is important to note a threat (initiating a fight or flight response) needs to be present in order for a management practice to be effective (other than habitat modification), otherwise species will become habituated to the intended threat over time. These deterrents have proven to be ineffective and are of little worth to procure or maintain. This is not an all-inclusive list.

3.2.4.1. Fake Effigies. Plastic owls and rubber snakes have been advertised to rid hangars and buildings of wildlife. These fake effigies have proven ineffective in practice.

However, use of actual depredated effigies in distressed positions has proven effective with specific species (vultures, crows, and ravens). However, properly positioned artificial effigies have proven effective to deter roosting vultures.

3.2.4.2. Rotating Lights. Rotating lights have provided conflicting results, but are generally considered ineffective. Birds in particular quickly habituate to these devices, and the problem remains unresolved.

3.2.4.3. Eyespots on Aircraft and Balloons. Study results suggest the addition of eyespots does not significantly reduce Bird/wildlife Aircraft Strike Hazard potential.

3.2.4.4. Ultra-sonic Devices. Ultra-sonic devices have proven unsuccessful in deterring wildlife from colliding with aircraft or inhabiting hangars. No birds, and very few wildlife species encountered in the typical airport environment are capable of detecting/hearing ultra-sonic sound, rendering these devices useless for dispersal.

3.2.4.5. Wild Predators. Wild predators (such as coyotes or resident raptors) create a direct and indirect hazard to aviation, and shall not be considered a natural remedy for Bird/wildlife Aircraft Strike Hazard concerns within the Aircraft Movement Area or Wildlife Exclusion Zone.

Chapter 4

BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD AND FLIGHT OPERATIONS

4.1. Flight Operations Overview. When passive environmental modifications and active control measures do not satisfactorily reduce Bird/wildlife hazards on the airfield, or when operating outside the local airfield environment, flight operations leadership will conduct an adequate risk-assessment. **(T-3)** Knowledge of unit operational and training requirements (combined with an understanding of local flying restrictions and Bird/wildlife hazards) is necessary to properly evaluate possible modifications to local procedures. As a result, it may be necessary to alter flying operations to reduce the risk of Bird/wildlife strikes. Bird Watch Condition codes are a valuable tool for supervisors to implement operational changes. These operational changes are dictated by the severity of the Bird/wildlife issue, the performance capability of the aircraft, and training or readiness requirements. Bird/wildlife hazards shall be assessed with respect to operational requirements such as bare-base deployments where initial resources for Bird/wildlife management may be limited. **(T-3)** However, during training to maintain operational readiness, modifications may be implemented to improve safety, reduce costly repairs, and protect aircrews.

4.1.1. Bird/wildlife Hazard Warning System. Wing, Base, and Installation Safety Offices will develop and provide a Wildlife Hazard Warning System to inform aircrews of possible flight hazards due to Bird/wildlife activity on the airfield and in local areas. **(T-2)** Bird Watch Condition codes will be used to communicate local Bird/wildlife activity along with location, number, and type of Bird/wildlife (refer to paragraph 2.2.2.3 for Bird Watch Condition definitions). **(T-1)** Installation Bird/wildlife Aircraft Strike Hazard plans will specify aircrew notification procedures for Bird Watch Condition changes. **(T-1)** The most expeditious means of communicating the status change should be used (e.g. ATC or SOF radio transmissions combined with Automated Terminal Information System updates or other broadcast medium).

4.1.1.1. When communicating Bird Watch Conditions, avoid color coded conditions to eliminate any confusion with color codes used during exercises, contingencies, and emergencies (See Paragraph 2.2. for further guidance).

4.1.1.2. Airfield Bird Watch Condition codes are based on observations of local airfield Bird/wildlife activity and are independent of the Bird Avoidance Model or Avian Hazard Advisory System risk hazard levels.

4.1.1.3. Bird Watch Condition SEVERE or MODERATE requires action from the installation's Bird/wildlife dispersal team to reduce the Bird Watch Condition to LOW as soon as possible. **(T-3)**

4.1.1.4. Supervisors and aircrews shall thoroughly evaluate mission requirements utilizing all available risk mitigation methods and tools before conducting flight operations in areas under Bird Watch Condition MODERATE and SEVERE. **(T-3)**

4.1.1.5. In the absence of MAJCOM, Mission Design Series (MDS)-specific or installation Bird Watch Condition guidance, refer to AFI 11-202V3, *General Flight Rules*, for further direction.

4.1.2. Phase I/II designation. Designate Phase I and Phase II periods of bird activity based on historical bird activity, current trend information, strike data, and local conditions. If local land-use practices, favorable meteorological conditions, or migratory bird patterns warrant, Phase II will remain in effect until the conditions change, and the birds leave (spring migration, harvest, weather changes). For example, installations located in high northern latitudes may remain in Phase II during the summer breeding season and in Phase I during winter when most birds migrate south.

4.1.2.1. The Bird Avoidance Model (paragraph 4.1.3.1) and locally assigned Natural Resources personnel are helpful in determining Phase I/II at continental United States locations.

4.1.2.2. Phase II declarations may warrant increased wildlife dispersal activities, increased frequency of airfield checks, and/or changes to flight operations. The installation Bird/wildlife Aircraft Strike Hazard plan shall address any required changes to Bird/wildlife Aircraft Strike Hazard responsibilities or flight operations during Phase II. **(T-3)** Establish flight and scheduling procedures to minimize risks based on local hazards associated with Phase II.

4.1.2.3. Wing safety offices will ensure Phase I and II designations are made in the appropriate DoD Flight Information Publications. **(T-3)** Make critical updates through the Notices to Airmen system (NOTAM). **(T-3)**

4.1.3. Mission Planning. Consult AFI 11-202V3, or AFI 11-502V3, *Small Unmanned Aircraft Systems Operations,* for mission planning requirements. Obtain the following from the Internet as part of mission planning to best assess low-level and special use airspace bird hazards: **(T-2)**

4.1.3.1. Bird Avoidance Model bird hazard risk predictions. This historically-based predictive model uses GIS technology as a tool for analysis and correlation of bird habitat, migration, and breeding characteristics, combined with key environmental and man-made geospatial data. The Bird Avoidance Model was primarily designed to provide schedulers and biologists with a long-range avian prediction model. It can be accessed at **www.usahas.com** (Select Area, then Content Display Google Map). The model is extremely useful in depicting favorable avian geographic locations/features and other secondary avian prediction aids (such as Next Generation Weather Radar (NEXRAD) and previous bird strike locations) along a planned flight route for situational awareness.

4.1.3.2. Avian Hazard Advisory System (AHAS) utilizes the Bird Avoidance Model as a foundation supplemented by NEXRAD weather radar to provide a near real-time description of bird activity. The system may be accessed at **www.usahas.com**. It does not make recommendations on restrictions to be imposed for any category of bird strike risk (Low, Moderate, or Severe). These decisions will be made at the local level after careful consideration of the mission design series, mission, and mission priority. The web site contains a continually revised tutorial explaining its development and use as well as downloadable training slides.

4.1.3.3. Aircrew briefings on bird strikes and other wildlife hazards will include, as a minimum: **(T-2)**

4.1.3.3.1. Potential bird hazards and attractants along the proposed route of flight using the Bird Avoidance Model and the Avian Hazard Advisory.

4.1.3.3.2. Consideration for use of the double helmet visors or sunglasses during daylight hours or clear visor at night or during low-level operations.

4.1.3.3.3. Actions, if flocks of birds are encountered.

4.1.3.3.4. Mission abort options/requirements due to a Bird/wildlife activity or strike.

4.1.4. Operational Modifications. The key to reducing Bird/wildlife strikes when modifying flight operations is to avoid known bird attractants, concentrations or movements of birds/wildlife. The following will help reduce wildlife hazards by modifying operational procedures:

4.1.4.1. Aircraft making formation departures increase the risk of damage from bird strikes when birds are feeding, loafing, or traversing near the runway. Formation and single-ship interval takeoffs often result in birds being scared up by the lead aircraft, causing the wingman to impact the birds. When the lead aircraft scares up large flocks of birds, the wingman should delay departure until the birds are clear of the runway. **(T-2)** Pilots of lead aircraft are responsible for alerting wingmen of observed bird hazards during takeoff. **(T-2)**

4.1.4.2. When flocks of migratory birds are observed, formation takeoffs and single-ship interval takeoffs with minimum spacing involving rejoins, increases the risk of serious bird strikes. The increased speed required to rejoin the lead aircraft after takeoff increases the risk of damage from bird strikes. When birds are known to be flying in the area, departures under Visual Meteorological Conditions (VMC) should be modified to reduce risk. **(T-3)** Departures should be made in trail, with the rejoin beginning after the aircraft passes 2,000 to 3,000' Above Ground Level (AGL). **(T-3)** If aircraft are to enter a low-level route immediately or stay at an intermediate altitude for a prolonged period, tactical formation normally provides enough aircraft clearance to allow wingmen to stay clear of birds.

4.1.4.3. Aircrews experiencing enroute bird strikes should abort the mission when practicable. **(T-3)** While some engine ingestions or a windscreen strike may be readily apparent from the flight deck, the damage from many engine, fuselage, wing, tail, or radome strikes cannot be adequately assessed inflight. Continuing a mission may cause greater structural or engine damage and lead to a serious emergency.

4.1.4.4. When sighting wildlife, aircrews will notify the controlling ATC facility and other aircrews if mission requirements allow. **(T-3)**

4.1.4.5. Flying low-level routes or low-level operations in special use airspace involves higher aircraft speeds and greater exposure within bird flight environments. Operations in this flight regime invariably results in an increase in the number of damaging bird strikes. During these flights, aircrews are typically involved in cockpit duties, allowing little time to monitor bird activity. Visually maintain an active scan of the local environment as much as possible during critical operations. Consider the following when operating aircraft in the low-level environment: **(T-3)**

4.1.4.5.1. Avoid areas with known raptor (birds of prey) concentrations during summer, between 1000 and 1700 hours due to increased thermals. Generally, a maximum altitude of 3,000-4,000' above ground level is reached by all raptor species, though soaring can occur at considerably higher altitudes. Areas with ideal terrain for creating thermals during summer months include ridgelines, and rolling hills.

4.1.4.5.2. Unless mission essential, avoid flying one hour before and after sunrise/sunset to reduce potential hazards when there is a known increase in Bird/wildlife activity.

4.1.4.5.3. Avoid altitudes with the most favorable wind speed and direction for migrating birds (particularly near shear altitudes) up to 48 hours prior to and 24 hours after frontal passage; especially during October and November. Prevailing weather is a prime stimulus for migratory bird movements.

4.1.4.5.4. Avoid flying near or over wildlife refuges, estuaries, parallel along shorelines, river corridors, landfills, stockyards, food processing plants or other known significant bird attractants below 3,000' above ground level.

4.2. Bird Hazard Identification. Bird populations must be monitored by local flight safety in both local flying and low-level flying areas. **(T-2)** In addition to the USAF Bird Avoidance Model and the Avian Hazard Advisory System, bird concentrations and movement information may be obtained from local universities, state/federal wildlife agencies, and private organizations (e.g. National Audubon Society). Utilize Natural Resources personnel or Bird/wildlife Aircraft Strike Hazard Specialists to periodically survey low level routes for wildlife attractants, hazards, and populations.

JOHN T. RAUCH, JR.
Major General, USAF
Chief of Safety

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

AFI 11-202V3, *General Flight Rules,* 10 Aug 16

AFI 11-502V3, *Small Unmanned Aircraft Systems Operation*, 21 Aug 15

AFI 21-201, *Munitions Management,* 3 Jun 15

AFI 31-101, *Integrated Defense (FOUO),* 5 Jul 17

AFI 32-1053, *Integrated Pest Management Program,* 20 Nov 14

AFI 32-7042, *Waste Management*, 7 Nov 14

AFI 32-7064, *Integrated Natural Resources Management,* 18 Nov 14

AFI 33-360, *Publications and Forms Management*, 1 Dec 15

AFI 36-2654, *Combat Arms Program,* 13 Jan 16

AFI 48-139, *Laser and Optical Radiation Protection Program,* 30 Sep 14

AFI 64-117, *Air Force Government-wide Purchase Card (GPC) Program,* 20 Sep 11

AFI 91-202, *The US Air Force Mishap Prevention Program*, 24 Jun 15

AFI 91-204, *Safety Investigations and Reports,* 12 Feb 14

AFI 91-207, *The US Air Force Traffic Safety Program,* 16 Feb 17

AFPD 91-2, *Safety Programs*, 1 May 17

AFMAN 33-363, *Management of Records,* 25 May 17

AFMAN 91-201, *Explosives Safety Standards,* 21 Mar 17

AFMAN 91-223, *Aviation Safety Investigations and Reports,* 16 May 13

Bald and Golden Eagle Protection Act (16 U.S.C. §§668-668d) 08 Jun 1940

EO 13112, *Invasive Species,* 3 Feb 99

EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, 10 Jan 01

FAA AC 150/5200-32B, *Reporting Wildlife Aircraft Strikes,* 31 May 13

FAA AC 150/5200-33B, *Hazardous Wildlife Attractants on or Near Airports,* 28 Aug 07

FAA AC 150/5200-34A, *Construction or Establishment of Landfills Near Public Airports,* 26 Jan 06

FAA AC 150/5200-36A, *Qualification for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife hazards on Airports,* 31 Jan 12

FAA AC 150/5320-5D, *Airport Drainage Design,* 13 May 13

Migratory Bird Treaty Act, as amended (16 U.S.C. §703 et. seq.) 1918

Memorandum of Agreement Between the Federal Aviation Administration, the U.S. Air Force, the U.S. Army, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture to Address Aircraft-Wildlife Strikes, 2003

Sikes Act (16 U.S.C. §§670a-f), as amended through P.L. 113-291, 19 Dec 14

T.O. 1-1-691, *Cleaning and Corrosion Prevention and Control, Aerospace and Non-Aerospace Equipment,* 13 Jul 17

UFC 3-260-01, *Airfield and Heliport Planning and Design,* 17 Nov 08

32 CFR 989, *Environmental Impact Analysis Process,* 08 Aug 17

40 CFR 258, *Criteria for Municipal Solid Waste Landfills* 01 Jul 11

50 CFR 21.41, *Depredation Permits* 01 Oct 09

50 CFR 21.43, *Depredation Order For Blackbirds, Cowbirds, Grackles, Crows, and Magpies* 01 Oct 03

51 CFR 41206, *Final Rule for Regulatory Programs of the Corps of Engineers* 13 Nov 86

DoD Instruction 4715.03, *Natural Resources Conservation Program,* 18 Mar 11

Supporting Information

ACRP Report 32, *Guidebook for Addressing Aircraft/Wildlife Hazards at General Aviation Airports,* 2010

ACRP Report 125, *Balancing Airport Stormwater and Bird Hazard Management*, 2015

ACRP Report 145, *Applying an SMS Approach to Wildlife Hazard Management*, 2015

ACRP Synthesis 23, *Bird Harassment, Repellent, and Deterrent Techniques for Use on and Near Airport*s, 2011

ACRP Synthesis 39, *Airport Wildlife Population Management*, 2013

ACRP Synthesis 52, *Habitat Management to Deter Wildlife at Airports*, 2014

AFI 32-7061, *The Environmental Impact Analysis Process,* 12 Mar 03

AFI 90-802, *Risk Management*, 11 Feb 13

AFPAM 90-803, *Risk Management (RM) Guidelines and Tools,* 11 Feb 13

Endangered Species Act of 1973, as amended (16 U.S.C. §§1531-1543) 27 Dec 1973

EO 11990, *Protection of Wetlands,* 24 May 77

EO 11988, *Floodplain Management*, 24 May 77

T.O. 11W2-9-2-31, *Operations and Maintenance Instructions with Illustrated Parts Breakdown Pyrotechnic Pistol AN-M8*, 30 Jun 04

T.O. 11W3-6-2-1, *Intermediate Maintenance Instructions with Illustrated Parts Breakdown Military Shotgun, 12 Gauge, Pump Action Model 870, with Adapter Part Number 32911,* 24 Feb 14

Prescribed Forms

None

Adopted Forms

AF Form 847, *Recommendation for Change of Publication,* 22 Sep 09

United States Fish and Wildlife Services FORM 3-200-13, *Federal Fish and Wildlife Permit Application Form.* **(Note: AF IMT Forms are no longer required, but still used by individuals. Please reference the Bird/wildlife website for these IMT forms)**

Terms

Aircraft— Term to include both manned and unmanned Aircraft, Remotely Piloted Aircraft, and Small Unmanned Aircraft Systems.

Aircraft Design—Engineering improvements that reduce aircraft damage when wildlife strikes occurs (for example, improved windscreen design).

Aircraft Movement Area—That area of the airfield encompassed by the primary surface and the clear zones, as well as all apron areas and taxiways, regardless of their location.

Bald and Golden Eagle Protection Act, 16 U.S.C. 668—The federal criminal statute that defines a misdemeanor to kill, take or possess Bald and Golden Eagles.

Bird/wildlife Aircraft Strike Hazard (BASH)—Wildlife, habitat, or conservation efforts that pose a risk to flight operations.

Bird/wildlife Aircraft Strike Hazard (BASH) Program Manager—Designated representative of the installation Chief of Safety (unless delegated to a different organization through a formal agreement, such as Contract, Host-Tenant Support Agreement, or Memorandum of Agreement), who oversees all Bird/wildlife Aircraft Strike Hazard (BASH)-related activities. The Program Manager may need to coordinate these activities with other agencies such as Civil Engineering Natural Resources, Pest Management, Air Traffic Control, Airfield Management and United States Fish and Wildlife Services.

Bird/wildlife Aircraft Strike Hazard (BASH) Plan—A written document that addresses wildlife strike hazards and designates organizations responsible for implementing solutions.

Bird/wildlife Avoidance—Techniques (including radar detection, warning, and use of wildlife data) that reduce potential for wildlife strikes by allowing aircrews to schedule or maneuver to avoid wildlife concentrations.

Bird/wildlife Control—Any biological, chemical, or physical procedure that discourages the presence of wildlife. These procedures include repellents, toxicants, harassment, trapping, shooting, grounds maintenance, and habitat modification.

Bird/wildlife Data—Information about the ecology, anatomy, physiology, behavior, size, movement, and distribution of wildlife that may be helpful in wildlife control, wildlife avoidance, and aircraft design.

Bird/wildlife Hazard Warning System—A set of procedures using standard wildlife watch condition codes for immediate exchange of information between ground and airborne personnel concerning the existence and location of wildlife posing a hazard to flight operations.

Bird/wildlife Hazard Working Group—A team of organizations involved in airfield wildlife control chaired by the installation's Wing Vice Commander of USAF flight assets or appropriate designee. The Bird Hazard Working Group will evaluate and coordinate all installation improvement projects (such as grounds maintenance, wastewater treatment, and golf courses) for wildlife hazard-related issues. At a minimum, Bird Hazard Working Groups will be comprised of representatives from the following organizations: Safety, Operations (flying squadrons, air traffic control, airfield management, and Operations Group Standardizations/Evaluations), Civil Engineering (natural resources, pest management, operations, wildlife biologist (if assigned) and infrastructure), Judge Advocate, Public Affairs, Security Forces, Services and flying tenant units.

Bird Species—A group of interbreeding birds with common characteristics such as size, shape, voice, and behavior.

Bird/wildlife Strike—Any collision between a bird or other species of wildlife and an aircraft.

Bird/wildlife Threat (Seasonal)—Wildlife threats associated with different time of the season or between the seasons (season changes).

Bird/wildlife Threat (Diurnal)—Wildlife threats associated during daylight hours.

Bird/wildlife Watch Condition (Bird Watch Condition) Codes—Designated codes, used to inform aircrews of possible flight hazards due to wildlife activity on the airfield and in local areas. These codes are used to communicate local wildlife activity along with location, number and type of wildlife.

Blading—Passive management technique by which a grader effectively removes all vegetative cover from an area for years by exposing the bare soil to environmental forces letting nature harden it over time. This technique is successful in desert environments where monotypic vegetative cover is difficult to grow.

Damaging Wildlife Strike—Any wildlife strike that causes reportable damage as defined in AFI 91-204, *Safety Investigations and Reports*.

Depredation—The legal action of taking wildlife via lethal means (such as trapping, shooting, poisoning, and birds of prey).

Edge Effect—Edge effect is created where two habitat types are juxtaposed (such as grass to brush, brush to trees, or brush to water). Edge habitat is especially attractive to many species because the higher vegetation provides cover, food, and nesting locations while low vegetation provides quick access to water, additional food sources, and prey species.

Endangered Species Act, 16 U.S.C. 1531—The federal environmental statute that defines a felony to "take" an endangered species. As used in the Act, "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect an endangered species. Criminal liability under this Act may be imposed for indirect takings resulting from the destruction of an endangered species habitat.

Exclusionary Wildlife Mitigation—Proactive long term implementation of management techniques to deny wildlife the ability to move freely in and around the aerodrome ultimately reducing the conditions wildlife find attractive.

Habitat—The total environmental elements of food, water, shelter, nesting sites, and space that must be present for wildlife species to survive.

Migratory Bird Treaty Act, 16 U.S.C. 703—The Federal statute that defines a felony to kill, take or possess migratory birds without a permit.

Non—damaging Bird/wildlife Strike-Any wildlife strike that does not cause reportable damage to the aircraft IAW AFI 91-204.

Supervisor of Flying— The SOF is a group-level position and is the direct representative of the OG/CC. The SOF is the focal point for command and control of flight operations.

Vegetative Cover—Term to include any and all plant life, including but not limited to: trees, shrubs, grass, cacti, moss, flowers, and even weeds.

Wildlife Mitigation (Passive)—Proactive long term techniques of managing the aerodrome in ways to eliminate or reduce the conditions wildlife find attractive.

Wildlife Mitigation (Active)—Physical actions to disperse or remove wildlife from an airfield allowing short-term relief from an immediate safety hazard.

Wildlife Exclusion Zone (Wildlife Exclusion Zone)—A locally defined, airfield specific area where a zero tolerance goal for hazardous wildlife is maintained. This area may encompass the Aircraft Movement Area and any additional habitat attractants (such as water treatment facilities, golf courses, and athletic fields) in proximity to the airfield and low-level flight corridors (such as final approach/departure).

Attachment 2

BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD (BASH)/WILDLIFE SURVEYS

A2.1. Conducting formal surveys helps personnel capture temporal (seasonal and diurnal) and spatial airfield use by wildlife as well as behavior, abundance, and diversity of species. The below surveys forms may be used as a guide for conducting formal Bird/wildlife Aircraft Strike Hazard (BASH)/Wildlife surveys on and around the airfield. Surveys should be adapted to best fit the specific wildlife hazards of a particular airfield.

A2.1.1. Wildlife survey methods. When not undergoing a formal Wildlife Hazard Assessment, conduct daytime wildlife survey point counts (three minutes at each survey point, as per industry standard) and mobile counts (observations made while driving between survey points) at least twice monthly consisting of three survey periods per day (dawn, midday, and dusk). **(T-2)** The location of all survey points and routes shall remain consistent over time. Include locations that are attractive to wildlife on and off airfield such as ponds, drainage culverts, and nearby housing and billeting areas (no time limit at known attractants). Airfield data parameters to compile include: location on the installation, species, number, and behavior. Conduct evening mammal surveys using visual enhancement devices (such as spotlight, Forward Looking Infrared scopes, night vision goggles, or a combination thereof) at least once a month starting 30 minutes after sunset. **(T-2)** No time limit should be associated with evening surveys. Large mammal surveys shall include all areas within the Aircraft Movement Area and areas within the airfield security fence having unimpeded access to the Aircraft Movement Area. **(T-2)** Indirect mammal surveys may be accomplished through tracks, bedding, nesting, and scat identifications. Conduct small mammal surveys (voles, mice and shrews) at least twice a year at a minimum in the spring and fall (see AFSEC website for protocol). **(T-2)** This data provides a relative index of small mammal populations, aids in predicting trends, and helps determine proper rodenticide application. Documenting raptor activity during formal wildlife surveys may provide an indirect measure of small mammal populations on the airfield. Data shall be compiled, analyzed and maintained by the office responsible for active Bird/wildlife Aircraft Strike Hazard mitigation. **(T-2)**

A2.1.2. Geographic Information Survey method. Utilize visual references to define grid boundaries, such as acreage between three taxiways and a runway. Do not substitute the Bird/wildlife Aircraft Strike Hazard grid with the emergency crash grid. Bird/wildlife Aircraft Strike Hazard grids should be simple and encompass sizable areas, in order to be useful in daily operations. At minimum, record the date, location, species, number engaged, and outcome (i.e., number dispersed, depredated, trapped-killed, and trapped-relocated). Documenting the local wildlife problem, technical assistance received, and the success of attempted solutions is an essential part of any wildlife hazard management program. Complete documentation may be required in civil litigation regarding the resolution of a wildlife hazard. Documenting the effectiveness of non-lethal techniques is necessary to obtain permits to use lethal action. Maintaining records of all wildlife affected during harassment and depredation operations will aid in data analysis and may provide support when seeking future wildlife depredation permits.

Table A2.1. Bird Survey Data Sheet.

Page_____of _____

BIRD SURVEY DATA SHEET

Date: _____ Time: _____ Weather/Temp: _____ Initials: _____

BWC: _____ Wind speed /Direction: _____

Location_____

Species	Number	Behavior	Comments

Location_____

Species	Number	Behavior	Comments

Location_____

Species	Number	Behavior	Comments

Location_____

Species	Number	Behavior	Comments

Behavior Codes:

1- Loafing on ground 2-Loafing on water 3-Perched on vegetation

4- Perched on manmade structure 5- Feeding 6- Flying over observation area 7-Aerial hunting

8-On ground in or adjacent to runway 9-Flying over runway

Table A2.2. Spotlight Survey Data Sheet.

Page_____of _____

SPOTLIGHT SURVEY DATA SHEET

Date: _________ Time: ________ Weather/Temp: ___________ Initials: ________

Wind speed /Direction: ____________

TIME	SPECIES	LOCATION	BEHAVIOR